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2004
AMENDMENTS
to the
Program of Studies: Senior High Schools

1. **Replace** (2003) front-end pages i to vi and Preamble pages 1 to 6 with **revised** (2004) front-end pages i to vi and Preamble pages 1 to 5.

2. LANGUAGE ARTS

   - **Replace** the Language Arts title page, following the Language Arts divider.
   - **Remove** and **discard** Communications 21a–21b (1978), page 1.
   - **Remove** and **discard** Literature 21a–21b (1978), page 1.
   - **Remove** and **discard** Reading 10 (1987), pages 1 to 4.

3. MATHEMATICS

   - **Replace** the Mathematics title page, following the Mathematics divider.
   - **Replace** Mathematics 14–24, pages 1 to 26, with **revised** Mathematics 14–24, pages 1 to 71.

4. SECOND LANGUAGES

   - **Replace** the Second Languages title page, following the Second Languages divider.
   - **Insert new** Italian Language and Culture 10S–20S–30S, pages 1 to 37, following Italian Language and Culture 10–20–30, page 37.

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PROGRAM of STUDIES

Senior High Schools

This Program of Studies is issued under the authority of the Minister of Learning pursuant to section 39(1) of the *School Act*, Revised Statutes of Alberta 2000, Chapter S–3 with amendments in force as of January 1, 2002.

Alberta
LEARNING

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This document reflects changes in the program of studies for senior high schools up to June 2004.

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PROGRAM OF STUDIES: SENIOR HIGH SCHOOLS

2004 CONTENTS

PREAMBLE

Introduction 1
Program Foundations 2
Religious and Patriotic Instruction 4
Learning Resources 5

Course **All programs of study are available for viewing and downloading at <http://www.learning.gov.ab.ca> under Kindergarten to Grade 12, Curriculum, Curriculum by Subject.**	A. Program Rationale and Philosophy	B. General Learner Expectations	C. Curriculum Standards/ Specific Learner Expectations
ABORIGINAL STUDIES 10–20–30	2002	2002	2002
CAREER INTERNSHIP 10	2002	2002	2002
CAREER AND LIFE MANAGEMENT	2002	2002	2002
CAREER AND TECHNOLOGY STUDIES			
Career and Technology Studies [applies to all 22 strands]	1999 p. 4 2004		
Agriculture	1997	1997	
Career Transitions	2000 p. 11 2003	1999 p. 26 2000 p. 15 2002 pp. 13, 18, 21 2003 pp. 14, 17, 20, 23–25 2004	
Communication Technology	1999 p. 11 2004	1999 pp. 16, 23, 31 2002 p. 13 2003 p. 17 2004	
Community Health	2001	2001 p. 17 2003	
Construction Technologies	1997 p. 11 1998	1997 p. 18 1998	
Cosmetology Studies	1997 p. 11 2002 p. 12 2003	1997 pp. 17–19, 21, 22, 25, 26, 29–44 2002	
Design Studies	1997	1997	
Electro-Technologies	2000 pp. 11, 12 2004	2000 p. 23 2003 pp. 25–42 2004	
Energy and Mines	1997	1997	
Enterprise and Innovation	1997	1997	
Fabrication Studies	2000 p. 11 2003	2000 pp. 17, 22, 27–37 2003	
Fashion Studies	1997	1997	
Financial Management	2000 pp. 9, 11 2003	2000 pp. 22, 23 2003	
Foods	1997 p. 11 2004	1997 pp. 18, 19, 25, 27 2004	
Forestry	1999	1999	
Information Processing	1999 pp. 9, 12 2002 p. 11 2003	1999 pp. 19, 20, 28–43 2002 pp. 13, 17 2003	
Legal Studies	1997	1997	
Logistics	1997	1997	
Management and Marketing	1999 p. 11 2002	1999 p. 27 2002	

The dates in the grid indicate the most current and up-to-date sections in each program of studies.

Course **All programs of study are available for viewing and downloading at <http://www.learning.gov.ab.ca> under Kindergarten to Grade 12, Curriculum, Curriculum by Subject.**	A. Program Rationale and Philosophy	B. General Learner Expectations	C. Curriculum Standards/ Specific Learner Expectations
Mechanics	1997 p. 11 1998	1997 pp. 21, 34 1998	
Tourism Studies	1997	1997 p. 18 2002	
Wildlife	1997	1997	
FINE ARTS	1986	1986	
Art [general]			1986
Art 10–20–30	1986	1986	1986
Art 11–21–31	1989	1989	1989
Drama 10–20–30	1991	1991	1991
Choral Music 10–20–30	1994	1994	1994
General Music 10–20–30	1991	1991	1991
Instrumental Music 10–20–30			
GREEN CERTIFICATE PROGRAM			
Green Certificate Program (applies to each specialization)	2000	2000	
Cow–Calf Beef Production Technician	2000	2000	
Dairy Production Technician	2000	2000	
Feedlot Beef Production Technician	2000	2000	
Field Crop Production Technician	2000	2000	
Irrigated Field Crop Production Technician	2000	2000	
Sheep Production Technician	2000	2000	
Swine Production Technician	2000		
INFORMATION AND COMMUNICATION TECHNOLOGY	2000	2000	2000
INTEGRATED OCCUPATIONAL PROGRAM			
English 16–26–36	1992	1992	1992
Occupational Component 16–26–36	1992	1992	1992
Social Studies 16–26	1992	1992	1992
Mathematics 16–26 Science 16–26	The interim 1992 programs of study are available on the Alberta Learning Web site or for purchase from the Learning Resources Centre.		
LANGUAGE ARTS			
English Language Arts			
English Language Arts 10-1, 20-1, 30-1	2003	2003	2003
English Language Arts 10-2, 20-2, 30-2	2003	2003	2003
English as a Second Language	1997	1997	1997
Français 10–20–30	2000❶		
French Language Arts 10–20–30	2000❶		
Ukrainian Language Arts	1990	1990	1990
MATHEMATICS			
Applied Mathematics 10–20–30	2002	2002	2002
Pure Mathematics 10–20–30	2002	2002	2002
Mathematics 31	1995	1995	
Mathematics 14–24	2004	2004	2004
Mathematics Preparation 10	2002	2002	2002

❶ Program information only.

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Course **All programs of study are available for viewing and downloading at <http://www.learning.gov.ab.ca> under Kindergarten to Grade 12, Curriculum, Curriculum by Subject.**	A. Program Rationale and Philosophy	B. General Learner Expectations	C. Curriculum Standards/ Specific Learner Expectations
NATIVE LANGUAGES			
Blackfoot Language and Culture 10–20–30	1993	1993	1993
Cree Language and Culture 10–20–30	1993	1993	1993
OTHER COURSES			
Special Projects 10–20–30	1995❶		
Work Experience 15–25–35	1995❶		
PHYSICAL EDUCATION K–12	2000	2000	2000 pp. 21, 29 2001
SCIENCE			
Science (Vision Statement)	1994		
Science 10	1992	1992	1992
	The Interim 1995 Science 10 Program of Studies is available on the Alberta Learning Web site.		
Biology 20–30	1998	1998	1998
Chemistry 20–30	1998	1998	1998
Physics 20–30	1998	1998	1998
Science 20–30	The Interim 1995 Science 20–30 Program of Studies is available on the Alberta Learning Web site.		
Science 14–24	2003	2003	2003
SECOND LANGUAGES			
French as a Second Language	1992	1992 pp. 7–8, 1994	1992 pp. 12–14, 1994 p. 17, 1994 p. 18, 1996
German Language and Culture 10–20–30	2003	2003	2003
German Language and Culture 10S–20S–30S	2003	2003	2003
Italian Language and Culture 10–20–30	2003	2003	2003
Italian Language and Culture 10S–20S–30S	2004	2004	2004
Japanese Language and Culture 10–20–30	1995	1995	1986
Latin	1986	1986	2003
Spanish Language and Culture 10–20–30	2003	2003	2003
Spanish Language and Culture 10S–20S–30S	2003	2003	2003
Ukrainian	1983	1983	1983
SOCIAL SCIENCES [general]	1985	1985	
Anthropology			
Cultural and Physical Anthropology 30		1985	1985
Economics		1985	
Economics for Consumers 20			1985
Microeconomics 30			1985
Macroeconomics 30			1985
Geography		1985	1985
Local and Canadian Geography 20			1985
World Geography 30			1985

Course **All programs of study are available for viewing and downloading at <http://www.learning.gov.ab.ca> under Kindergarten to Grade 12, Curriculum, Curriculum by Subject.**	A. Program Rationale and Philosophy	B. General Learner Expectations	C. Curriculum Standards/ Specific Learner Expectations
History			
Western Canadian History 20		1985	1985
Canadian History 20		1985	1985
Western World History 30		1985	1985
Philosophy			
Origins of Western Philosophy 20		1985	1985
Contemporary Western Philosophy 20		1985	1985
Philosophies of Man 30		1985	1985
Political Science			
Political Thinking 20		1985	1985
Comparative Government 20		1985	1985
International Politics 30		1985	1985
Psychology		1985	
Personal Psychology 20			1985
General Psychology 20			1985
Experimental Psychology 30			1985
Religious Studies		1985	
Religious Ethics 20			1985
Religious Meanings 20			1985
World Religions 30			1985
Sociology		1985	
General Sociology 20			1985
Sociological Institutions 20			1985
Applied Sociology 30			1985
SOCIAL STUDIES			
Social Studies 10–20–30	2000	2000	2000
Social Studies 13–23–33	2000	2000	2000

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INTRODUCTION

Program of Studies

The *Program of Studies* identifies the outcomes for the core and optional learning components for Kindergarten to Grade 12. Content is focused on what students are expected to know and be able to do.

Though organized into separate subject, course or program areas, there are many connections across the curriculum. Students see the world as a connected whole rather than as isolated segments. Integrating across content areas, and providing ways for students to make connections, enhances student learning. The reporting of student progress should, nevertheless, be in terms of the outcomes outlined in courses of study for each subject area.

Within any group of students there is a range of individual differences. Flexibility in planning for individuals within a group is needed. Therefore, school organization and teacher methodology are not mandated at the provincial level and may vary from class to class and school to school in order to meet student needs.

For guidelines and regulations relating to school programs and organization for instruction, refer to the *Guide to Education: ECS to Grade 12*, available for viewing and downloading from the Alberta Learning Web site. Print copies are available for purchase from the LRC.

Basic Learning Resources

Alberta Learning authorizes a variety of resources to support the programs of study. Complete listings of all resources can be found in the *Learning Resources Centre Resources Catalogue*, or electronically through the:

- LRC Web site at www.lrc.learning.gov.ab.ca.

Resource listings can also be accessed through the:

- Authorized Resources Database at www.learning.gov.ab.ca under Kindergarten to Grade 12, Curriculum and Resources, Curriculum Resources.

Alberta Learning Web Site

Information covering all areas of Kindergarten to Grade 12 education in Alberta, including curriculum and resources, can be found at www.learning.gov.ab.ca under Kindergarten to Grade 12.

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PROGRAM FOUNDATIONS

Alberta's Learning System[1]

Vision

The best learning system in the world.

Mission

Alberta Learning, through its leadership and work with stakeholders, ensures that learners are prepared for lifelong learning, work and citizenship so they are able to contribute to a democratic, knowledge-based and prosperous society.

Core Businesses

Support the Learning System: Lead, Promote, and Support Excellence in the Learning System through Adult Learning, Apprenticeship and Industry Training, Basic Learning, and Learner Transitions

Goal 1 – High Quality Learning Opportunities for All

Support the Learner: Provide Opportunities for Learner Success through Adult Learning, Apprenticeship and Industry Training, Basic Learning, and Learner Transitions

Goal 2 – Excellence in Learner Outcomes

Support the Ministry to Ensure Excellence of the Learning System through Communications, Corporate Services, Information and Strategic Services, and System Improvement and Reporting

Goal 3 – Highly Responsive and Responsible Ministry

Principles

Learner Centred

- The lifelong learning system is focused on the learner.

Accessible

- Albertans have access to affordable, quality learning opportunities.

Collaborative

- Learning is a lifelong human endeavor that best occurs when partners and stakeholders work together to provide a holistic approach and a supportive environment.

Accountable

- The learning system is accountable to Albertans for quality results, system sustainability, and fiscal responsibility.

Responsive

- The learning system is flexible and meets and anticipates learner need.

Innovative

- The learning system demonstrates leading edge innovation for improved results.

Equitable

- Albertans have equitable access to lifelong learning opportunities.

Values

- Respect
- Integrity
- Trust
- Openness
- Caring

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[1] Excerpted from the *Alberta Learning 2004–2007 Business Plan*, March 2004. This plan is available on the Alberta Learning Web site at www.learning.gov.ab.ca.

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Goals and Standards Applicable to the Provision of Basic Education in Alberta[1]

A basic education must provide students with a solid core program, including language arts, mathematics, science and social studies.

Students will be able to meet the provincial graduation requirements and be prepared for entry into the workplace or post-secondary studies. Students will understand personal and community values and the rights and responsibilities of citizenship. Students will develop the capacity to pursue learning throughout their lives. Students also should have opportunities to learn languages other than English and to attain levels of proficiency and cultural awareness which will help to prepare them for participation in the global economy.

Student Learning Outcomes

Students are expected to develop the knowledge, skills and attitudes that will prepare them for life after high school. A basic education will allow students to:

- read for information, understanding and enjoyment
- write and speak clearly, accurately and appropriately for the context
- use mathematics to solve problems in business, science and daily-life situations
- understand the physical world, ecology and the diversity of life
- understand the scientific method, the nature of science and technology, and their application to daily life
- know the history and geography of Canada and have a general understanding of world history and geography
- understand Canada's political, social and economic systems within a global context
- respect the cultural diversity and common values of Canada
- demonstrate desirable personal characteristics, such as respect, responsibility, fairness, honesty, caring, loyalty and commitment to democratic ideals
- recognize the importance of personal well-being, and appreciate how family and others contribute to that well-being
- know the basic requirements of an active, healthful lifestyle
- understand and appreciate literature, the arts and the creative process
- research an issue thoroughly, and evaluate the credibility and reliability of information sources
- demonstrate critical and creative thinking skills in problem solving and decision making
- demonstrate competence in using information technologies
- know how to work independently and as part of a team
- manage time and other resources needed to complete a task
- demonstrate initiative, leadership, flexibility and persistence
- evaluate their own endeavours and continually strive to improve
- have the desire and realize the need for lifelong learning.

Standards for Student Learning

The Minister of Learning defines acceptable standards and standards of excellence for student achievement in consultation with Albertans. Employers are involved in specifying the knowledge, skills and attitudes needed in the workplace. Schools, school authorities and the Minister of Learning assess and report regularly to the public on a range of student learning.

The school's primary responsibility is to ensure that students meet or exceed the provincial standards, as reflected in the Student Learning Outcomes (outlined above), the Alberta Programs of Study, provincial achievement tests, diploma examinations and graduation requirements.

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[1] Excerpted from the *K–12 Learning System Policy, Regulations and Forms Manual*. This manual is available on the Alberta Learning Web site at www.learning.gov.ab.ca.

Education Delivery

Schools must engage students in a variety of activities that enable them to acquire the expected learnings. Schools have authority to deploy resources and may use any instructional technique acceptable to the community as long as the standards are achieved. Schools, teachers and students are encouraged to take advantage of various delivery options, including the use of technology, distance learning and the workplace.

Schools play a supportive role to families and the community in helping students develop desirable personal characteristics and the ability to make ethical decisions. Schools also help students take increasing responsibility for their learning and behaviour, develop a sense of community belonging and acquire a clearer understanding of community values and how these relate to personal values.

Students learn basic, transferable knowledge, skills and attitudes in school. Schools, in co-operation with employers, provide opportunities for students to develop and practise employability skills. The Minister of Learning provides credit for off-campus learning that is approved and accepted by the school and the employer. Government works with schools, employers and post-secondary institutions to help young people make a smooth transition to work and further study.

RELIGIOUS AND PATRIOTIC INSTRUCTION

The following section of the *School Act* focuses on religious and patriotic instruction. It is cited here for the information of administrators and teachers.

SECTION 50(1) A board may

(a) prescribe religious instruction to be offered to its students;

(b) prescribe religious exercises for its students;

(c) prescribe patriotic instruction to be offered to its students;

(d) prescribe patriotic exercises for its students;

(e) permit persons other than teachers to provide religious instruction to its students.

(2) Where a teacher or other person providing religious or patriotic instruction receives a written request signed by a parent of a student that the student be excluded from religious or patriotic instruction or exercises, or both, the teacher or other person shall permit the student

(a) to leave the classroom or place where the instruction or exercises are taking place for the duration of the instruction or exercises, or

(b) to remain in the classroom or place without taking part in the instruction or exercises.

1988 cS–3.1 s33;1990 c36 s16

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LEARNING RESOURCES

Policy

Alberta Learning selects, acquires, develops, produces, translates and authorizes the best possible instructional materials for the implementation of approved programs of study.

Learning Resource Categories

In terms of provincial policy, learning resources are those print, nonprint and electronic software materials used by students or teachers to facilitate learning and teaching. Many learning resources, both publisher-developed and teacher-made, are available for use in implementing elementary, junior high and senior high programs. Decisions about the selection and use of resources are a local matter and should take into account student skill levels, interests, motivations and stages of development.

Alberta Learning authorizes learning resources in three categories:

- basic student learning resources
- support student learning resources
- authorized teaching resources.

Authorization indicates that the resources meet high standards and can contribute to the attainment of the goals of the program. However, the authorization of resources does not require their use in program delivery. Under section 60(2) of the *School Act*, school boards may approve materials for their schools, including resources that are withdrawn from the provincial list. Many school boards have delegated this power to approve resources to school staff or other board employees under section 61(1) of the *School Act*.

Basic Student Learning Resources

Basic learning resources are those student learning resources authorized by Alberta Learning as the most appropriate for addressing the majority of outcomes of the course(s), substantial components of the course(s), or the most appropriate for meeting general outcomes across two or more grade levels, subject areas or programs as outlined in provincial programs of study. These may include any resource format, such as print, nonprint, computer software, manipulatives or video.

In exceptional circumstances, a teacher resource may be given basic status.

Support Student Learning Resources

Support learning resources are those student learning resources authorized by Alberta Learning to assist in addressing some of the outcomes of course(s) or components of course(s); or to assist in meeting the outcomes across two or more grade levels, subject areas or programs as outlined in the provincial programs of study. These may include any resource format, such as print, nonprint, computer software, manipulatives or video.

Authorized Teaching Resources

Authorized teaching resources are those teaching resources produced externally to Alberta Learning (for example, by publishers) that have been reviewed by Alberta Learning, found to meet the criteria of review and to be the best available resources to support the implementation of programs of study and courses, and the attainment of the goals of basic learning; they have been authorized by the Minister. Teaching resources produced as service documents by Alberta Learning are authorized by definition.

Availability

Most authorized resources are available for purchase from the Learning Resources Centre (LRC), 12360 – 142 Street, Edmonton, Alberta, Canada, T5L 4X9. Telephone 780–427–2767, Fax 780–422–9750, Internet www.lrc.learning.gov.ab.ca.

Resources are listed in the *Learning Resources Centre Resources Catalogue* and at the LRC Web site. Resources are also listed in the Authorized Resources Database at the Alberta Learning Web site. See page 1.

LANGUAGE ARTS

CONTENTS

English Language Arts
- English Language Arts 10-1, 20-1, 30-1
- English Language Arts 10-2, 20-2, 30-2

English as a Second Language

Français 10–20–30

French Language Arts 10–20–30

Ukrainian Language Arts [ECS – Grade 12]

MATHEMATICS

CONTENTS

Applied Mathematics 10–20–30

Pure Mathematics 10–20–30

Mathematics 31

Mathematics 14–24

Mathematics Preparation 10

MATHEMATICS 14–24

PROGRAM RATIONALE AND PHILOSOPHY

The need for and use of mathematics in our daily lives is changing. This necessitates a change in the emphasis of mathematics education. The emphasis has shifted from the memorization of mathematical formulae and algorithms to the use of mathematics to reason, interpret and explore. The focus is on developing students' mathematical knowledge, skills and attitudes through a problem-solving approach. More than ever before, students must become creative and logical thinkers, data managers and problem solvers. They must develop communication skills and be cooperative and interactive to cope with daily life today and tomorrow.

The use of technology is increasing in importance in our society. This is reflected in our mathematics curriculum. The integration of technology into the mathematics classroom allows students to use computers and calculators to provide quick and accurate computation and manipulation, to enhance conceptual understanding, and to facilitate higher order thinking.

Students have to understand how mathematical concepts permeate daily life, business and industry. They have to be given real-world activities and problems so they can make connections between classroom learning and the world in which they live. Students need to be exposed to varied, interrelated experiences that encourage them to understand and appreciate the role of mathematics in our society.

The Mathematics 14–24 program is derived from *The Common Curriculum Framework for K–12 Mathematics: Western Canadian Protocol for Collaboration in Basic Education*, 1995, and *The Common Curriculum Framework for K–12 Mathematics Grade 10 to Grade 12: Western Canadian Protocol for Collaboration in Basic Education*, 1996. Outcomes have been modified as needed. The Mathematics 14–24 sequence is designed for students whose needs, interests and abilities focus on basic mathematical understanding. The emphasis is on the acquisition of practical life skills and proficiency in using mathematics to solve problems, accommodate change, interpret information and create new knowledge within meaningful contexts.

BELIEFS ABOUT STUDENTS AND MATHEMATICS LEARNING

Students must construct their own meaning of mathematics.

Students are curious, active learners who have individual interests, abilities and needs. They come to classrooms with different knowledge, life experiences and backgrounds that generate a range of attitudes about mathematics and life.

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Students learn by attaching meaning to what they do; and they must be able to construct their own meaning of mathematics. This meaning is best developed when learners encounter mathematical experiences that proceed from the simple to the complex and from the concrete to the abstract. The use of manipulatives can address the diversity of learning styles and developmental stages of students and can enhance the formation of sound, transferable, mathematical concepts. At all levels, students benefit from working with appropriate materials, tools and contexts when constructing personal meaning about new mathematical ideas. The learning environment should value and respect each student's way of thinking, so that the learner feels comfortable in taking intellectual risks, asking questions and posing conjectures.

Mathematics is a common human activity, increasing in importance in a rapidly advancing, technological society. Proficiency in using mathematics increases the opportunities available to individuals. Students need to become mathematically literate in order to explore problem-solving situations, accommodate changing conditions and actively create new knowledge in striving for self-fulfillment.

GOALS FOR STUDENTS

Mathematics education must prepare students to use mathematics to solve problems.

The main goals of mathematics education are to prepare students to:

- use mathematics confidently to solve problems
- communicate and reason mathematically
- appreciate and value mathematics
- commit themselves to lifelong learning
- become mathematically literate adults, using mathematics to contribute to society.

Positive attitudes toward mathematics are important.

At the completion of a program, students should have developed a positive attitude toward mathematics and have a base of knowledge and skills related to number, patterns and relations, shape and space, and statistics and probability.

It is important for students to develop a positive attitude toward mathematics so that they can become confident in their ability to undertake the problems of a changing world, thereby experiencing the power and usefulness of mathematics. Students also should gain an understanding and appreciation of the contributions of mathematics, as a science and as an art, to civilization and to culture.

Students should:

- exhibit a positive attitude toward mathematics
- engage and persevere in mathematical tasks and projects
- contribute to mathematical discussions
- take risks in performing mathematical tasks
- exhibit curiosity
- show enjoyment of mathematical experiences.

All students should receive a level of mathematics education appropriate to their needs and abilities.

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CONCEPTUAL FRAMEWORK FOR K–12 MATHEMATICS

This framework summarizes the philosophical view toward mathematics and mathematics education.

Students of mathematics, regardless of age or experience, strive to do mathematics in settings that are new to them. The conceptual framework outlined in this section presents a multifaceted view of mathematics and presents the discipline as skills, procedures and concepts woven together.

The framework chart below shows how student outcomes, organized by grade and strand, are designed to be influenced by Mathematical Processes and the Nature of Mathematics. These components are described more fully in this section.

STRAND	Kindergarten to Grade 12	
Number • Number Concepts • Number Operations **Patterns and Relations** • Patterns • Variables and Equations • Relations and Functions **Shape and Space** • Measurement • 3-D Objects and 2-D Shapes • Transformations **Statistics and Probability** • Data Analysis • Chance and Uncertainty	**GENERAL OUTCOMES, SPECIFIC OUTCOMES AND ILLUSTRATIVE EXAMPLES** **to** **Outline Knowledge, Skills and Attitudes about Mathematics**	**NATURE OF MATHEMATICS** **Change, Constancy, Dimension (size and scale), Number, Pattern, Quantity, Relationships, Shape, Uncertainty**

MATHEMATICAL PROCESSES – COMMUNICATION, CONNECTIONS, ESTIMATION AND MENTAL MATHEMATICS, PROBLEM SOLVING, REASONING, TECHNOLOGY, VISUALIZATION

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MATHEMATICAL PROCESSES

There are critical components that students must encounter in a mathematics program in order to achieve the goals of mathematics education and to encourage lifelong learning in mathematics. Students are expected to:

• *Communication* [C]	• communicate mathematically
• *Connections* [CN]	• connect mathematical ideas to other concepts in mathematics, to everyday experiences and to other disciplines
• *Estimation and Mental Mathematics* [E]	• use estimation and mental mathematics where appropriate
• *Problem Solving* [PS]	• relate and apply new mathematical knowledge through problem solving
• *Reasoning* [R]	• reason and justify their thinking
• *Technology* [T]	• select and use appropriate technologies as tools to solve problems
• *Visualization* [V]	• use visualization to assist in processing information, making connections and solving problems.

This program of studies incorporates these seven interrelated mathematical processes that are intended to permeate teaching and learning.

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Communication

Students must be able to communicate effectively how an answer was obtained.

Students need to communicate mathematical ideas clearly and effectively, orally and in writing.

Communication will help students make connections among different representations of mathematical ideas; namely, "physical, pictorial, graphic, symbolic, verbal and mental representations." (NCTM, p. 26)

NCTM COMMUNICATION STANDARDS

K–4	5–8	9–12
The study of mathematics should include numerous opportunities for communication so that students can:	*The study of mathematics should include opportunities to communicate so that students can:*	*The mathematics curriculum should include the continued development of language and symbolism to communicate mathematical ideas so that all students can:*
• relate physical materials, pictures, and diagrams to mathematical ideas • reflect on and clarify their thinking about mathematical ideas and situations • relate their everyday language to mathematical language and symbols • realize that representing, discussing, reading, writing, and listening to mathematics are a vital part of learning and using mathematics.	• model situations using oral, written, concrete, pictorial, graphical, and algebraic methods • reflect on and clarify their own thinking about mathematical ideas and situations • develop common understandings of mathematical ideas, including the role of definitions • use the skills of reading, listening, and viewing to interpret and evaluate mathematical ideas • discuss mathematical ideas and make conjectures and convincing arguments • appreciate the value of mathematical notation and its role in the development of mathematical ideas.	• reflect upon and clarify their thinking about mathematical ideas and relationships • formulate mathematical definitions and express generalizations discovered through investigations • express mathematical ideas orally and in writing • read written presentations of mathematics with understanding • ask clarifying and extending questions related to mathematics they have read or heard about • appreciate the economy, power, and elegance of mathematical notation and its role in the development of mathematical ideas.
(NCTM, p. 26)	(NCTM, p. 78)	(NCTM, p. 140)

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Connections

Through connections students should begin to view mathematics as an integrated whole.

Students need numerous and varied experiences in order to appreciate the usefulness of mathematics and, at the same time, to explore connections within mathematics, from mathematics to other disciplines, and from mathematics to their daily experiences. When mathematical ideas are connected to each other through concrete, pictorial and symbolic representations, students begin to view mathematics as an integrated whole.

This integration "allows students to see how one mathematical idea can help them understand others, and it illustrates the subject's usefulness in solving problems, describing and modeling real-world phenomena, and communicating complex thoughts and information in a concise and precise manner." (NCTM, p. 94)

NCTM CONNECTIONS STANDARDS

K–4	5–8	9–12
The study of mathematics should include opportunities to make connections so that students can:	*The mathematics curriculum should include the investigation of mathematical connections so that students can:*	*The mathematics curriculum should include investigation of the connections and interplay among various mathematical topics and their applications so that all students can:*
• link conceptual and procedural knowledge • relate various representations of concepts or procedures to one another • recognize relationships among different topics in mathematics • use mathematics in other curriculum areas • use mathematics in their daily lives.	• see mathematics as an integrated whole • explore problems and describe results using graphical, numerical, physical, algebraic, and verbal mathematical models or representations • use a mathematical idea to further their understanding of other mathematical ideas • apply mathematical thinking and modeling to solve problems that arise in other disciplines, such as art, music, psychology, science, and business • value the role of mathematics in our culture and society.	• recognize equivalent representations of the same concept • relate procedures in one representation to procedures in an equivalent representation • use and value the connections among mathematical topics • use and value the connections between mathematics and other disciplines.
(NCTM, p. 32)	(NCTM, p. 84)	(NCTM, p. 146)

Estimation and Mental Mathematics

Mental mathematics is the cornerstone for estimation.

Students need to know when and how to estimate. The context of a problem helps to determine when it is necessary or desirable to have an exact answer or an estimate of that answer. Problem contexts include number, patterns and relations, shape and space, and statistics and probability. The use of technology increases the emphasis on estimation skills to enable students to determine the reasonableness of computed answers.

A variety of estimation strategies assists students in arriving at quick approximations for exact answers.

Facility with mental mathematics is an important outcome for students. A focus on mental mathematics forces students to think and improve their efficiency and accuracy in calculating, including pencil and paper calculations. Mental mathematics is the cornerstone for estimation and leads to better understanding of number concepts and number operations. (Hope, pp. 161–173)

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Problem Solving

Problem solving is the focus of mathematics at all grade levels.

"Problem solving—which includes the ways in which problems are represented, the meanings of the language of mathematics, and the ways in which one conjectures and reasons—must be central to schooling so that students can explore, create, accommodate to changed conditions, and actively create new knowledge over the course of their lives." (NCTM, p. 4)

Problem solving is the focus of mathematics at all grade levels. The development of each student's ability to solve problems is essential. Students develop a true understanding of mathematical concepts and procedures when they solve problems in meaningful contexts. Problem solving is to be employed throughout all of mathematics and should be embedded throughout all of the strands.

Problem solving provides an opportunity for students to be active in constructing mathematical meaning, to learn problem-solving strategies, to practise a variety of concepts and skills in a meaningful context, and to communicate mathematical ideas. Most problem-solving situations in the elementary years come from the everyday experiences of the student. Students are able to attach mathematical meaning to familiar activities. As they progress through school, the problems become more complex. The problems will arise from an exploration of mathematics itself, as well as from the world around them. Gradually, students become more confident in their ability to use and communicate mathematics, using correct terminology.

As students develop mathematically, they are able to solve more challenging problems on an increasing variety of topics. Students need the opportunity "to solve problems that require them to work cooperatively (and individually), to use technology, to address relevant and interesting mathematical ideas, and to experience the power and usefulness of mathematics." (NCTM, pp. 75–76) By the time students reach the secondary level, many problem-solving strategies should be internalized and problem solving should be a process for constructing and reinforcing mathematical concepts.

Students should be confident and flexible problem solvers, using a wide range of strategies in their work, and accept that some problems have different solutions.

NCTM PROBLEM-SOLVING STANDARDS

K–4	5–8	9–12
The study of mathematics should emphasize problem solving so that students can:	*The mathematics curriculum should include numerous and varied experiences with problem solving as a method of inquiry and application so that students can:*	*The mathematics curriculum should include the refinement and extension of methods of mathematical problem solving so that all students can:*
• use problem-solving approaches to investigate and understand mathematical content • formulate problems from everyday and mathematical situations • develop and apply strategies to solve a wide variety of problems • verify and interpret results with respect to the original problem • acquire confidence in using mathematics meaningfully.	• use problem-solving approaches to investigate and understand mathematical content • formulate problems from situations within and outside mathematics • develop and apply a variety of strategies to solve problems, with emphasis on multistep and nonroutine problems • verify and interpret results with respect to the original problem situation • generalize solutions and strategies to new problem situations • acquire confidence in using mathematics meaningfully.	• use, with increasing confidence, problem-solving approaches to investigate and understand mathematical content • apply integrated mathematical problem-solving strategies to solve problems from within and outside mathematics • recognize and formulate problems from situations within and outside mathematics • apply the process of mathematical modeling to real-world problem situations.
(NCTM, p. 23)	(NCTM, p. 75)	(NCTM, p. 137)

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Reasoning

Reasoning helps students to make sense of mathematics and to be logical in their thinking.

Students need to develop confidence in their ability to reason and to justify their thinking within and outside of mathematics. The power of reasoning helps students to make sense of mathematics, to be logical in their thinking, and to convince others.

Inductive reasoning helps students explore and make conjectures from activities that allow generalizations from a pattern of observations.

Deductive reasoning helps students test conjectures and build arguments that serve to validate thinking. Deductive reasoning builds a structured body of knowledge.

NCTM REASONING STANDARDS

K–4	5–8	9–12
The study of mathematics should emphasize reasoning so that students can:	*Reasoning shall permeate the mathematics curriculum so that students can:*	*The mathematics curriculum should include numerous and varied experiences that reinforce and extend logical reasoning skills so that all students can:*
• draw logical conclusions about mathematics • use models, known facts, properties, and relationships to explain their thinking • justify their answers and solution processes • use patterns and relationships to analyze mathematical situations • believe that mathematics makes sense.	• recognize and apply deductive and inductive reasoning • understand and apply reasoning processes, with special attention to spatial reasoning and reasoning with proportions and graphs • make and evaluate mathematical conjectures and arguments • validate their own thinking • appreciate the pervasive use and power of reasoning as a part of mathematics.	• make and test conjectures • formulate counterexamples • follow logical arguments • judge the validity of arguments • construct simple valid arguments.
(NCTM, p. 29)	(NCTM, p. 81)	(NCTM, p. 143)

Technology

Technology will aid students in solving complex problems.

Improvements in technology, and its increased availability in schools, have changed the focus of mathematics education. The time saved by using calculators or computers to perform complex calculations can be used to help students better understand mathematical concepts. Students can then understand the relationships among concepts and use these relationships to solve problems.

Calculators and computers can be used as tools to:

- develop concepts
- explore and demonstrate mathematical relationships and patterns
- organize and display data
- assist with solving problems and thus promote independence
- encourage students to be inquisitive and creative
- decrease the time spent on tedious computations
- reinforce the learning of basic number facts and properties
- develop an understanding of computational algorithms

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- create geometric displays
- simulate situations.

In some cases, technology will allow teachers to ask questions requiring a high level of thinking and will allow students to solve complex, multifaceted problems. Technology can foster environments in which the growing curiosity of students can lead to rich mathematical discoveries. In these environments, the control of exploring mathematical ideas can be turned over to students.

Visualization

Images are useful in describing the physical and mathematical environment.

Visualization "involves thinking in *pictures* and *images* and the ability to perceive, transform and re-create different aspects of the visual–spatial world." (Armstrong, p. 10, italics in original) The use of images in the study of mathematics provides students with the opportunity to understand mathematical concepts and to make connections among them.

The physical environment is full of images. The images are of 3-D objects, 2-D shapes, 1-D lines and pictures. In geometry, the study of a 3-D object is assisted by visualizing either the net of 2-D shapes or the skeleton of 1-D lines required to construct the object.

The mathematical environment is full of images. These images are used to communicate mathematical concepts and multiple solutions to problems. At an elementary level, four piles, each containing three coins, can be used to represent $3 + 3 + 3 + 3 = 12$. Rearranging the piles into four rows of 3 can then be used to represent $4 \times 3 = 12$. Connecting the two images links the process of multiplication with that of repeated addition. At a more advanced level, analytic geometry describes figures algebraically and provides a tool for the visualization of algebraic relations. The analysis and interpretation of data, using a visual summary, aids in understanding the data and making predictions from it.

NATURE OF MATHEMATICS

- *Change*
- *Constancy*
- *Dimension*
- *Number*
- *Pattern*
- *Quantity*
- *Relationships*
- *Shape*
- *Uncertainty*

By enriching our view of mathematics and the learning environment, the outcomes of the program of studies can be accomplished.

The brain is constantly looking for and making connections. "Because the learner is constantly searching for connections on many levels, educators need to orchestrate the experiences from which learners extract understanding. . . . Brain research establishes and confirms that multiple complex and concrete experiences are essential for meaningful learning and teaching." (Caine, p. 5)

There are additional critical components that must be addressed in a mathematics program beyond those listed as mathematical processes. The components discussed are: Change, Constancy, Dimension (size and scale), Number, Pattern, Quantity, Relationships, Shape and Uncertainty. They are used to describe mathematics in a broad way in order to establish the wide variety of connections that can be made among the various strands used to organize the outcomes central to the program of studies.

Change

Change is a very broad concept. Students must become sensitive to patterns, such as linear, exponential, logarithmic and periodic.

Change can be discussed from Kindergarten to Grade 12 across many aspects of mathematics. The study of change is often discussed in the context of calculus, but is often limited to this context. However, change is a much broader concept than that used in calculus. In order to

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make predictions, students need to describe and quantify their observations, attempt to build patterns, and identify those quantities that remain fixed and those quantities that change. For example, look at the pattern 4, 6, 8, 10, 12,.... An elementary school student can describe this as skip counting by 2s, starting from 4. A senior high school student may describe this pattern as an arithmetic sequence, with first term 4, and a common difference of 2. Another student may describe it as a linear function with a discrete domain. All three interpretations are focusing on the changing size of the numbers within the sequence. To be able to understand change, students must become sensitive to patterns, such as linear, exponential, logarithmic and periodic. (Steen, p. 184)

Constancy

Constancy is described by the terms stability, conservation, equilibrium, steady state and symmetry.

Students are expected to communicate ideas visually, using diagrams and oral and written words, when describing constancy or invariance. Different aspects of constancy "are described by the terms stability, conservation, equilibrium, steady state, and symmetry." (AAAS–Benchmarks, p. 270) The most important properties in mathematics and science relate to those properties that do not change when outside conditions change. Elementary school students deal with constancy in situations where different methods are used to solve a single multiplication problem, such as finding the area of a 3-tile by 4-tile tabletop. Secondary students need to deal with constancy when they solve the more complicated multiplication problems that appear in determining the number of elements present in the sample spaces of probability problems. Many of these situations will involve permutations and combinations.

In geometry, a circle can be transformed into an ellipse by a simple stretch, and into a square by a more complex series of transformations; but there is no way that the circle can be transformed into a parabola. The closed figures, such as circles and squares, remain closed and cannot be transformed into open figures, such as parabolas. Triangles can be distorted in many ways, but all will have an angle sum of 180°. The straight line is characterized as having all its parts with the same slope. In solving many of the most important problems in mathematics, students need to concentrate on the properties that remain constant. This idea enables students to solve problems involving constant rates of change, lines with constant slope, direct variation situations, or the angle sums of polygons.

Dimension (size and scale)

The concept of dimension needs to be developed within an environment of physical objects.

The concept of dimension, most usually associated with 3-D objects, 2-D shapes or 1-D lines, needs to be developed within an environment of physical objects for all grades from Kindergarten to Grade 12. The prediction of the change in dimension of objects can be done using numbers attached to appropriate units. For example, with no knowledge of a formula, students in upper elementary grades can predict that doubling the side of a square generates four times the area. Junior and senior high school students need to be able to use algebraic structures to formalize this relationship.

Physical objects can all be described using measurement concepts. The development of perimeter, area and volume concepts relies on pattern recognition, not on memorization of formulas. Descriptions of geometric patterns (number of vertices, sides and edges of various 3-D objects, 2-D shapes and 1-D lines); and the angle sum of various 2-D shapes is also encouraged. This type of data should be placed in charts and/or graphs to help students visualize their findings and predict patterns.

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Number

The use of number must include number sense.

Number, number systems and the operations on numbers are vital to all mathematics learning. The use of number must go beyond procedure and accuracy to include what is called number sense. Number sense includes:

- an intuitive feeling about numbers and their multiple relationships
- construction of the meaning of number through a variety of experiences, and development of an appreciation of the need for numbers beyond whole numbers (NCTM, p. 38)
- an appreciation and ability to make quick order of magnitude approximations (Steen, p. 79) with emphasis on establishing quick and accurate estimations for computation and measurement
- the ability to detect arithmetic errors
- knowledge of place value and the effects of arithmetic operations.

Many numerical calculations are performed with calculators and computers, and students must be able to determine if the desired calculations have been done correctly. Students must plan for the efficient use of technological tools.

Number patterns should be recognized and used to count, to make predictions, to describe shapes and to compare.

Pattern

Mathematics is an exploratory science that seeks to understand every kind of pattern.

"What humans do with the language of mathematics is to describe patterns. Mathematics is an exploratory science that seeks to understand every kind of pattern." (Steen, p. 8) Patterns exist in number, geometry, algebra and data. By helping students recognize, extend, create and use patterns as a routine aspect of their lives, mathematics will become a useful tool to assist them in their systematic and intellectual understanding of their environment.

Quantity

Quantitatively literate people use numbers to describe phenomena in all aspects of mathematics.

"Quantitatively literate young need a flexible ability to identify critical relations in novel situations, to express these relations in effective symbolic form, to use computing tools to process information, and to interpret the results of those calculations." (Steen, p. 65)

Students have a strong desire to measure, code and order things. To this end, some of the outcomes are about single numbers, numbers attached to units of measure, and ordered sets of numbers. Other outcomes are about the interpretation of numbers and of number systems. The use of single numbers and of ordered pairs to describe phenomena in all aspects of mathematics, the natural sciences and the social sciences is very important.

With the growing use of technology to process numerical information, it is becoming essential for students to have a wide range of estimation skills so that they can evaluate whether or not the numerical output provided by a calculator or a computer is a reasonable solution to a given problem.

Relationships

The study of mathematics is the development of relationships between and among things.

The study of mathematics is the development of relationships between and among things. Part of mathematics should help students develop a sense of discovery that mathematicians over the years have felt and should prepare the way for students to make their own discoveries. Students should look for relationships among physical things, as well as the data used to describe those things. Descriptions of the attributes of objects are used to analyze symmetry and congruence and to classify things, using increasingly sophisticated language. Relationships will be described visually, symbolically, orally and in written form.

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Shape

Shape in mathematics includes geometric representations of algebraic relations, the geometry of maps and the creation of networks of figures.

Shape in mathematics is central to geometry but also includes geometric representations of algebraic relations, the geometry of maps and the creation of networks of plane figures that can be used to construct 3-D objects. It is very important for students to look for and use similarities, congruences, patterns, transformations, dilatations and tessellations in the solution of a range of problems.

The use of language to describe shapes is an important aspect of mathematics. This description allows for the classification of objects according to various attributes, the naming of objects, and the analysis of objects. The study of shape can be used to build a deductive system, which can assist in further, more detailed analysis. Shape is used in the development of visual models in other disciplines, such as the use of molecular models in chemistry and biology.

The use of technology to analyze and depict shape will increase in importance for students of mathematics as more and better software and hardware become available in classrooms.

Uncertainty

Uncertainty involves data, chance, measurements and errors.

Uncertainty involves data, chance, measurements and errors. Problems dealing with data, together with numbers in context found in the mass media, can be solved within the school mathematics program so long as the data provided and the problems posed have some meaning and relevance to students.

Chance deals with the predictable and the unpredictable outcomes of events. Students from an early age are expected to deal with the concept of chance. As they mature, the language they use to describe chance becomes more sophisticated and involves the vocabulary of probability theory.

When dealing with random events and complex experiments, students can generate large quantities of data requiring analysis. The use of various technologies enables the student to summarize data easily and to create a visualization of the data to help identify patterns in the information. In some instances the functions describing patterns are linear, periodic, logarithmic or exponential, and senior high school students are expected to use the appropriate algebraic structures to model the information contained within the pattern.

The quality of the output information is directly related to the quality of the input data. The study of uncertainty allows students to assess the reliability of input data, and to learn the processes whereby input data is converted to output information.

STRANDS

- *Number*
- *Patterns and Relations*
- *Shape and Space*
- *Statistics and Probability*

The student outcomes are organized within four strands. The strands are the formal aspects of the discipline of mathematics that form the foundation of the program of studies and act as connections across the grades. Four strands have been identified for the program of studies to reinforce the interrelationship of mathematical concepts and skills. These strands are split into substrands. However, any such grouping into strands and substrands is for organizational purposes only, and does not reflect the connections among the strands and the underlying themes running throughout all of mathematics.

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Number

Number Concepts

Students will:

- use numbers to describe quantities
- represent numbers in multiple ways.

Number Operations

Students will:

- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

Patterns and Relations

Patterns

Students will:

- use patterns to describe the world and to solve problems.

Variables and Equations

Students will:

- represent algebraic expressions in multiple ways.

Relations and Functions

Students will:

- use algebraic and graphical models to generalize patterns, make predictions and solve problems.

Shape and Space

Measurement

Students will:

- describe and compare everyday phenomena, using either direct or indirect measurement.

3-D Objects and 2-D Shapes

Students will:

- describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.

Transformations

Students will:

- perform, analyze and create transformations.

Statistics and Probability

Data Analysis

Students will:

- collect, display and analyze data to make predictions about a population.

Chance and Uncertainty

Students will:

- use experimental or theoretical probability to represent and solve problems involving uncertainty.

STUDENT EXPECTATIONS

The content of the program of studies is stated in terms of outcomes. These outcomes are measurable and identify what students are required to know and be able to do.

The outcomes are developed and based on the expectation that they are appropriate to a large majority of the students. There may be some time delays between where students first encounter the learning and where they are expected to demonstrate knowledge of, or mastery in, that learning.

Student expectations are described in terms of:

- *general outcomes*
- *specific outcomes*
- *illustrative examples.*

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General Outcomes

General outcomes are general statements that identify what students are expected to know and be able to do upon completion of a course.

Specific Outcomes

Specific outcomes are statements identifying the component knowledge, skills and attitudes of a general outcome.

Illustrative Examples

Illustrative examples are sample tasks that demonstrate and elaborate on the general and specific outcomes. They are important in conveying the richness, breadth and depth intended in the outcomes. The illustrative examples are for discretionary use.

SUMMARY

The components of the conceptual framework for Kindergarten to Grade 12 mathematics, as described, dictate what should be happening in mathematics education. The components are not meant to stand alone, but are to be interrelated to enhance one another. Activities that take place in the classroom should stem from a problem-solving approach built upon the seven mathematical processes. These processes lead students to an understanding of the nature of mathematics through specific knowledge, skills and attitudes related to each of the strands.

INSTRUCTIONAL FOCUS

SUGGESTED TIME ALLOTMENTS

The program of studies is arranged into four strands, each of significance. Therefore, considerable time should be spent on the concepts and processes identified in each strand.

Several additional considerations are important.

- Integration of the mathematical processes, within each strand, is encouraged and expected.
- By decreasing emphasis on rote calculation, drill and practice, and the size of numbers used in paper and pencil calculations, more time is available for concept development.
- Problem solving, reasoning and connections are vital to increasing mathematical power and must be integrated throughout the program. A minimum of half the available time within all strands needs to be dedicated to activities related to these processes.
- There is to be a balance between estimation and mental mathematics, paper and pencil exercises and the appropriate use of technology, including calculators and computers. Concepts should be introduced, using manipulatives, and gradually developed from the concrete to the pictorial to the symbolic.
- There is an assumption made that all students have regular access to appropriate technology. For Mathematics 14–24, calculators and standard spreadsheet programs are appropriate.

CODING OF OUTCOMES FOR MATHEMATICS 14–24

The specific outcomes for Mathematics 14 and Mathematics 24 have been numbered sequentially within each strand.

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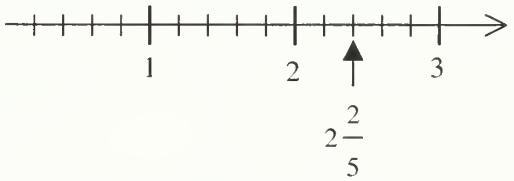
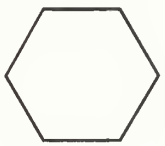
Strand: Number (Number Concepts)
Students will:
- use numbers to describe quantities
- represent numbers in multiple ways.

[C]	Communication	[PS]	Problem Solving
[CN]	Connections	[R]	Reasoning
[E]	Estimation and Mental Mathematics	[T]	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Develop and demonstrate a number sense for rational numbers, decimals, common fractions, integers and whole numbers. **Specific Outcomes** 1. Demonstrate and explain the meaning of fractions, concretely, pictorially and symbolically. [C, CN, R, V]	1.1 a) Have students work with fractions that represent: • part of a group; e.g., $\frac{1}{3}$ of the group were boys • part of a whole; e.g., $\frac{1}{2}$ of the pizza has pineapple on it • a measurement; e.g., a point on a number line  b) Have students work with common fractions; e.g., halves, thirds, fourths, fifths, sixths, eighths, tenths, hundredths. c) Have students use manipulatives to demonstrate that fractions may be less than one or greater than one. 1.2 Show that one half is equivalent to three sixths, using the following figure.  Add and trace more pattern blocks to make a new figure that shows: a) one fifth is equivalent to two tenths b) six eighths is equivalent to three fourths.

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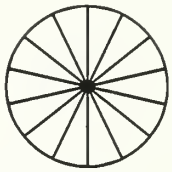
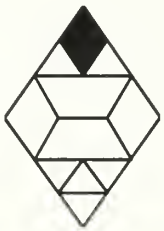
Strand: Number (Number Concepts)
Students will:
- use numbers to describe quantities
- represent numbers in multiple ways.

[C]	Communication	[PS]	Problem Solving
[CN]	Connections	[R]	Reasoning
[E]	Estimation and Mental Mathematics	[T]	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	1.3 Use fraction circles to show one half. What equivalent names match your choices? Give three other names equivalent to one half. Identify fraction circles that show two thirds. Name a fraction that is greater than one half but less than two thirds. How could you use fraction circles to show your reasoning?  1.4 Let the base-10 flat represent one whole square. Use centimetre cubes to build a one-layer shape that is less than one whole square. Record your shape on cm grid paper. Write a fraction and a decimal to tell how much of the square is covered by your shape and how much is not covered by your shape. 1.5 With the help of pattern blocks, and using the value of the yellow hexagon as one whole, make a pattern with a value of $2\frac{1}{2}$. 1.6 The following diagram is made from pattern block pieces. If the shaded area has a value of $\frac{1}{3}$, what is the value of the whole design? Make a design with a value of eleven thirds. Rearrange the blocks to show eleven thirds as a mixed number. 

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Strand: Number (Number Concepts)
Students will:
- use numbers to describe quantities
- represent numbers in multiple ways.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
2. Demonstrate and explain the meaning of ratio concretely, pictorially and symbolically. [C, CN, R, V]	2.1 Dennis linked 10 cubes together in this order: G G G G Y G G G G Y What ratio describes: 2:8 4:1 8:10 Suppose Dennis continued the pattern to cover a 10 by 10 grid. How would the ratios change? How would you use per cent to describe: a) the green area? b) the area not green? c) the yellow area? Would it be true to write the following about the yellow area? $0.20 = \frac{2}{10} = \frac{1}{5}$ Explain. Sketch and label a 5-cube sequence. Describe the colours in different mathematical ways. 2.2 A fruit punch is made by mixing 3 L of pop with 1 L of orange juice. Model the situation with two different coloured tiles. Find the amount of pop required for 2 L, 3 L and 4 L of orange juice. Write each case as a ratio.
3. Represent and apply fractions as per cents, and per cents in fraction or decimal form. [CN, E, PS, R, T]	3.1 Have students bring in examples of ratios, per cents, decimals and fractions from newspapers or magazines, or by searching the Internet. Discuss with the class why the chosen form was used in each case. Does one form tend to be used more often in particular types of media? Adapted with permission of the British Columbia Ministry of Education.

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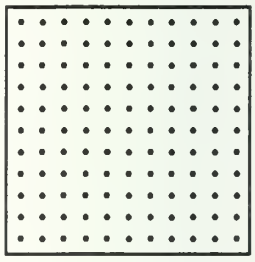
Strand: Number (Number Concepts)
Students will:
- use numbers to describe quantities
- represent numbers in multiple ways.

[C]	Communication	[PS]	Problem Solving
[CN]	Connections	[R]	Reasoning
[E]	Estimation and Mental Mathematics	[T]	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	3.2 Give students lists of fractions and decimals to arrange in numerical order and place on a number line. Have students develop lists of rules based on their work, which they can use to place numbers in order. a) Can students correctly order and place numbers? b) Do they make conversions correctly? c) Do the rules they identify accurately reflect the process? Reproduced with permission of the British Columbia Ministry of Education. 3.3 Have students use a chart to represent numbers taken from real-life data in as many ways as possible; e.g., ratio, fraction, per cent, decimal. 3.4 Have students practise calculating common percentages mentally; e.g., 7%, 15%, 25%, 50%. a) What is the GST on a $90 pair of running shoes? b) If 25% of the 600 people at a basketball game are with the visiting team, how many people is this? 3.5 Simulation: The stock market. Choose ten stocks that students are familiar with from the Toronto Stock Exchange. Give students a fictional amount of money to invest and have them track the movement of the stocks each day. Then, by converting to decimal fractions and per cents, have them calculate how much money they have made or lost. Adapted with permission of the British Columbia Ministry of Education. 3.6 Let the largest possible square on an 11 by 11 pin geoboard have a value of 1. Construct a different (noncongruent) shape for each part named below: a) 0.25 of the square b) $\frac{1}{4}$ of the square c) 25% of the square.  Record, colour and label each shape on geodot paper. How is each coloured part the same? Shannon outlined a new shape. She says the ratio of the coloured part to the whole square is 3:5. Record and colour one possible shape Shannon might have used. Record other ways to name this shape as part of 1.

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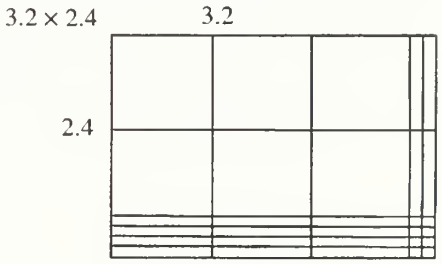
Strand: Number (Number Operations)
Students will:
- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Apply arithmetic operations on common fractions, decimals and integers, and illustrate their use in solving problems. **Specific Outcomes**	
4. Use estimation strategies to justify or assess the reasonableness of calculations. [C, E, PS, R]	4.1 Liam bought 3 equally priced CDs and a tape priced at $11.95. He paid $71.20 in total. Before you calculate the exact cost of each CD, explain why it must be less than $20.00. What was the cost of each CD? Estimate the GST on the total.
5. Demonstrate an understanding of and proficiency with adding, subtracting, multiplying and dividing decimals (for more than 2-digit divisors or multipliers, the use of technology is expected). [E, PS, T]	5.1 Apples cost $1.39 per kilogram. If you have $6.00, can you purchase a 3.75 kg bag of these apples? Explain how you could make an estimate to be sure, before you purchase the apples. Find the exact cost of the apples. 5.2 Revalue the base-10 blocks. For example, let the "flat" represent one. Then the "long" represents one tenth, and the "unit" represents one hundredth. The diagram below shows the multiplication 3.2×2.4.  Use base-10 blocks and this diagram to find the product, and explain your procedure. 5.3 Jacques bought 13.2 m of fabric to make tablecloths. Each cloth takes 2.4 m of fabric. How many tablecloths can he make? Use base-10 blocks to find the answer. Explain how your answer is related to the answer you get on your calculator.

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Strand: Number (Number Operations)
Students will:
- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

[C]	Communication	[PS]	Problem Solving
[CN]	Connections	[R]	Reasoning
[E]	Estimation and Mental Mathematics	[T]	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
6. Demonstrate an understanding of integers and use arithmetic operations to solve problems involving integers. [PS, V, T]	6.1 Show how you can use two different coloured cubes to represent the following numbers, and combine them. $(^+10) + (^-6) =$ $(^-4) + (^-7) =$ $(^-8) + (^+5) =$ 6.2 Calvin put equal numbers of white and black cubes in a container to make a neutral charge. He then put in 6 white cubes to make a charge of $^-6$. From this container he removed four black cubes and wrote $(^-6) - (^+4) = (^-10)$. Show why this is true and use a similar method to find: $(^+5) - (^-2)$ $(^-3) - (^-5)$ $(^+7) - (^+6)$ 6.3 Hoang explained $(^+5) \times (^-2)$ as putting 5 groups of 2 white chips each into a container for a product of $^-10$. He explained $(^-6) \times (^+4)$ as taking 6 groups of 4 black chips out of a neutral container for a product of $^-24$. Using Hoang's reasoning, demonstrate and explain $(^-3) \times (^-5)$ and $(^+7) \times (^+6)$. 6.4 The temperature fell 2°C per hour for a total temperature change of $^-10$°C. How many hours did this take? 6.5 Extend the following pattern, and describe the rule that is used. $^-3, 6, ^-12, \ldots$ 6.6 Provide an answer and have students suggest as many questions as they can that would result in that answer; e.g.: A = 6, Q = 2 + 4, 3 × 2, 20 – 14, 24 ÷ 4 … Adapted with permission of the British Columbia Ministry of Education. 6.7 The temperature in the morning was 7°C. By noon the temperature went up 9°C. By late afternoon it fell 5°C, and by midnight it dropped another 9°C. What is the final temperature?
7. Apply order of operations to solve problems, using paper and pencil or a calculator. [PS, T, V]	7.1 Determine the missing operation signs so that the following statement is true. $(7.4 \square 2.1) \square 14 = 1.11$ 7.2 Place parentheses in the following equation to make it true. $4 + 5 \times 3 - 8 = 19$

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Strand: Number (Number Operations)
Students will:
- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
8. Demonstrate an understanding of and proficiency with adding, subtracting, multiplying and dividing fractions concretely, pictorially and symbolically. [E, PS, V]	8.1 Eric ordered several large pizzas for a party. $1\frac{1}{2}$ pepperoni pizzas and $\frac{2}{3}$ of a pineapple pizza were not eaten. Was there the equivalent of more than two large pizzas left over? Explain how you can estimate the answer. Solve using a pencil and paper method, and use paper circles to explain your method and your answer. 8.2 Mr. Blair's gas tank was $\frac{7}{8}$ full when he left home. He knows he will use $\frac{3}{4}$ of a tank of gas on his errands. Will he have enough fuel to do his errands. Use fraction strips to explain your method and your answer. 8.3 Lisa had $\frac{3}{4}$ of a large candy bar. She gave $\frac{1}{3}$ of what she had to Shannon. Explain how you know that Shannon got less than $\frac{1}{3}$ of a whole bar by: a) using a pencil and paper method b) folding a piece of paper that represents a whole candy bar. 8.4 Miko has $2\frac{1}{2}$ m of blue cloth. How many pieces $\frac{1}{4}$ m long can she cut from her piece? Estimate the answer and explain the solution by: a) using a pencil and paper method b) using manipulatives. 8.5 In the community hall, $\frac{1}{4}$ of the people present are men, $\frac{1}{3}$ are women and the rest are children. There are 840 people in the hall. How many children are there?

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Strand: Number (Number Operations)
Students will:
- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	8.6 Provide students with a recipe that contains fractions; e.g., $\frac{1}{3}$ cup, and ask students how they would double or triple the recipe. Have them determine when they would use mathematics to calculate new amounts of ingredients and when they would simply duplicate the original amounts. How would they halve the recipe? Have students use measuring cups and water to represent the situation and verify solutions. Adapted with permission of the British Columbia Ministry of Education. 8.7 Invite students to play games and create their own games that incorporate operations with rationals; e.g., mathematics crossword, mathematics bingo, who am I? Adapted with permission of the British Columbia Ministry of Education.

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Strand: Number (Number Operations)
Students will:
- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

[C]	Communication	[PS]	Problem Solving
[CN]	Connections	[R]	Reasoning
[E]	Estimation and Mental Mathematics	[T]	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Apply the concepts of rate, ratio, percentage and proportion to solve problems in meaningful contexts. **Specific Outcomes** 9. Estimate and calculate percentages. [E, PS, T]	9.1 Les Krantz, in his book called *What the Odds Are*, found that men will suffer severe hair loss—baldness—by the time they reach the age ranges listed below: 20–29: 1 in 5 30–39: 3 in 10 40–49: 2 in 5 50–59: 1 in 2 60–69: 2 in 3 70–79: 3 in 4 How many men in every hundred would you expect to have lost most of their hair by the time they reach these age ranges? a) 20 to 29 b) 40 to 49 c) 60 to 69 Predict the percentage of men between the ages of 80 to 89 who will be bald. Explain your reasoning for your prediction. 9.2 Donna works at a local hardware store, making $25 000 per year. In March, her boss requests that she take a 5% salary reduction, as business is slow and she needs to stabilize the store's financial position. Donna agrees, and by June the situation has improved; her boss awards her a 5% salary increase. Has Donna's salary returned to the $25 000 level? Explain your answer. 9.3 Almost 14% of Canada's land surface is covered by wetlands. If Canada's land surface is 1020 million hectares, how many hectares are covered by wetlands?

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Strand: Number (Number Operations)
Students will:
- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

[C]	Communication	[PS]	Problem Solving
[CN]	Connections	[R]	Reasoning
[E]	Estimation and Mental Mathematics	[T]	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
10. Derive and apply unit rates. [PS, R]	10.1 A carpenter bought 2.5 kg of nails. The total cost was $3.75. What was the cost of 1 kg? 10.2 Toothpaste is advertised as 75¢ for a 50 mL tube. A 75 mL tube is priced at $1.09. Which is the better buy? Why? 10.3 Compare values, using flyers from two grocery outlets. 10.4 Have students compare the cost of 1 kg of bulk peanuts with the cost of 1 kg of peanuts bought in smaller packages. 10.5 Travelling from Saskatoon to Regina, a distance of 276 km, took 3 hours. What was the rate of speed in km/hr? 10.6 Mark drove from Seattle to Portland, a distance of 124 miles, in 2 hours. What was his rate of speed in miles per hour?
11. Express rates and ratios in equivalent forms to solve problems. [PS, R, T]	11.1 Gas usage is expressed as the rate of the number of litres of gas used per 100 km. On a 225 km trip, Nadia used 20.5 L of gas. Express her usage in terms of the above rate. Why do you think this type of rate is used? 11.2 While visiting the California coast, Theresa drove 270 miles. If she used $11\frac{1}{2}$ gallons of gas, what was her rate of gas use? Express your answer in miles per gallon. 11.3 In Canada, there are 1 million curlers registered in 1200 clubs. In Scotland, there are 50 000 curlers in 52 clubs, and in Sweden there are 9000 curlers in 36 clubs. Write a ratio for each to compare the number of curlers to the number of clubs, and arrange these in order of size from least to greatest.

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Strand: Number (Number Operations)
Students will:
- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]

11.4 Using a spreadsheet template and the ratios calculated in 11.3, find the number of curlers for 1 club; i.e., a rate, as well as for 36, 52 and 1200 clubs for each country. Your template should appear similar to the one that follows:

Number of Curlers

Country	1 club	36 Clubs	52 clubs	1200 clubs
Sweden		9000		
Scotland			50 000	
Canada				1 000 000

11.5 Have you read, or heard of, the book by Jonathan Swift called *Gulliver's Travels*? Gulliver, a ship captain, suffers a shipwreck and finds himself in the land of Lilliput. Here he finds that the heights of the people, plants and animals are in a 1:12 ratio to the heights of the people, plants and animals in his world. Use a measuring tape to measure yourself. Then complete this chart.

Body Part	Actual Length	Length in Lilliput
Length of arm		
Length of your shoe		
Circumference of your head		

Each day the Emperor of Lilliput gave Gulliver the food and drink necessary to feed about 1 728 Lilliputians. How did the Emperor's mathematicians arrive at this number? Explain why this should be about the right amount.

Note: In this illustrative example, you could use SI or imperial units.

11.6 Which is the better buy:
1.2 L orange juice for $2.50 or 0.75 L orange juice for $1.40?

11.7 Walter and Pat have the same ratio of country CDs to rock CDs. Walter has 3 country CDs for every 5 rock CDs. Pat has 48 country and rock CDs altogether. How many of Pat's CDs are rock?

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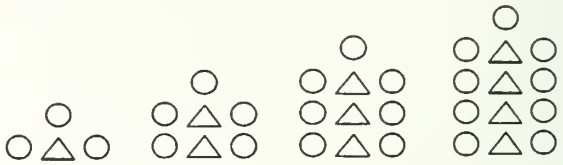
Strand: Patterns and Relations (Patterns)
Students will:
- use patterns to describe the world and to solve problems.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Use patterns, variables and expressions, together with their graphs, to solve problems. **Specific Outcomes** 1. Generalize a pattern arising from a problem-solving context, using mathematical expressions and equations, and verify by substitution. [C, CN, PS, R]	1.1 Long-Foi made the following pictures with circles and triangles.  He started making a chart to show the number of circles and triangles in each picture. a) Complete Long-Foi's chart and look for a pattern. b) Write a mathematics sentence to show the relationship between the number of circles and the number of triangles. c) Make concrete models or pictures to verify your answers. d) How many circles would you need in a picture with 12 triangles? e) How can you find and verify the answer? f) Substitute numbers in your sentence for each picture. 1.2 Read students the story *The King's Chessboard*, by David Birch. Have students explore pattern, by predicting the amounts that will result if one used a doubling pattern to cover the chessboard with grains of rice: one grain in the first square, two grains in the second square, four grains in the third square, and so on. Have them estimate the total number of grains and then find a way to calculate the result.

Picture	Number of Circles	Number of Triangles
1	3	1
2	5	2
3		
4		

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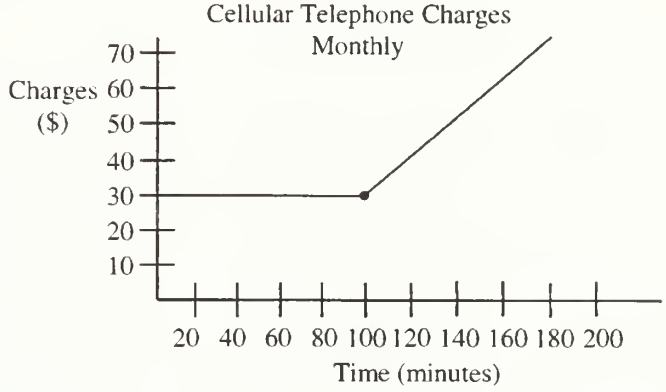
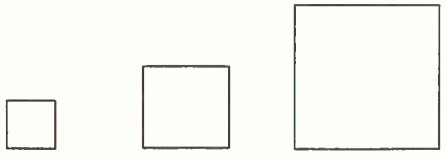
Strand: Patterns and Relations (Patterns)
Students will:
- use patterns to describe the world and to solve problems.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
2. Interpolate and extrapolate number values from a given graph. [E, PS, V]	2.1 The graph shows how much Carol pays per month for her cellular telephone use outside of prime-time hours—7 p.m. to 7 a.m.  a) If Carol uses her telephone for 20 minutes in one month, how much will her telephone bill be? How much will her bill be, if she uses her telephone for 85 minutes? Explain. b) If Carol uses her telephone for 130 minutes, how much will her telephone bill be? c) If Carol's bill for the month was $65, how many minutes did Carol talk on the telephone? d) Estimate how much Carol's telephone bill would be, if she used her telephone for 240 minutes in one month. Extend the graph to check your estimate. e) Explain in words how Carol gets charged by the cellular telephone company.
3. Graph relations, analyze the result and draw a conclusion from a pattern. [R, V]	3.1 Measure the sides of each of the squares provided, and find the perimeter of each square. a) Make a graph by plotting the length of the sides on the horizontal axis and the perimeters on the vertical axis. b) Describe the pattern in the graph. c) From the results of this graph, make a rule for finding the perimeter of a square. d) Explain how you could verify your rule. 

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Strand: Patterns and Relations (Patterns)
Students will:
- use patterns to describe the world and to solve problems.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
4. Substitute numbers for variables in expressions, and graph and analyze the relation. [C, PS, R, V]	4.1 Mitch got a job at "Ease-a-phone," a new cellular telephone company. He will be paid $20 a day plus $8.50 for every new customer he signs to an "Ease-a-phone" contract. Mitch used the expression E = 20 + 8.5C to determine his earnings per day—E stands for earnings, and C stands for new contracts. C | 0 | 1 | 2 | . . . E | 20 | 28.50 | 37.00 | . . . a) Which variable is dependent? On which axis will it go? b) Continue Mitch's chart and make a graph to show the relationship. c) Will you join the points on the graph with a line? Explain. d) Discuss the pros and cons to this kind of earnings arrangement. 4.2 An expression for the mass of two cans and five bearings is $2c + 5b$. Find the total mass, if each can has a mass of 200 g and each bearing has a mass of 75 g. 4.3 A formula for finding the perimeter of a rectangle is $P = 2l + 2w$. Find the perimeter when l is 8 cm and w is 6 cm.
5. Translate between an oral or written expression and an equivalent algebraic expression. [C, CN]	5.1 Write an algebraic expression for the following: Force equals mass times acceleration. 5.2 Describe the following algebraic equations in words. a) $A = \frac{1}{2} bh$ b) $P = 2l + 2w$ 5.3 Carl has 30 coins, all dimes and quarters. Write an expression to represent the number of dimes, if he has x quarters.

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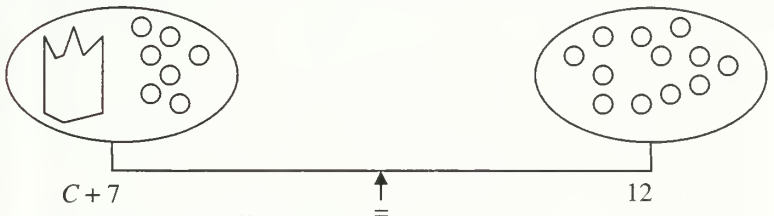
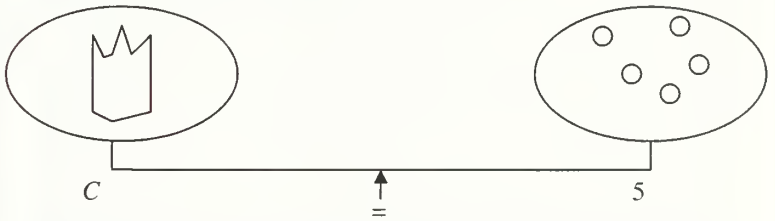
Strand: Patterns and Relations (Variables and Equations)
Students will:
- represent algebraic expressions in multiple ways.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Use variables and equations to express, summarize and apply relationships as problem-solving tools. **Specific Outcomes** 6. Solve and verify one-step linear equations, using a variety of techniques including concrete materials and diagrams. [PS, R]	6.1 Have students use manipulatives or models to explore the concept of balance or equality; e.g., have students use: a) a weight balance b) hands-on equations. Adapted with permission of the British Columbia Ministry of Education. 6.2 Jill had some CDs in a case. After Jay gave her 7 more, she had 12 CDs in all. How many CDs were in the case? Jose wrote the equation $C + 7 = 12$. He used a balance scale model to solve it. Let represent the CDs Jill originally had.  He took 7 CDs off each side.  Illustrate Jose's method in solving the following problem: Bill had six books. Teruko gave him some more, and then he had 10 books. How many books did Teruko give Bill?

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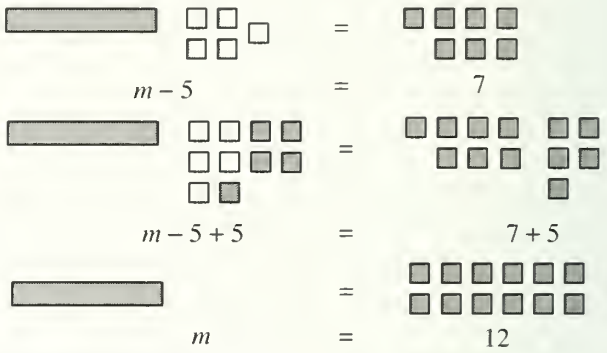
Strand: Patterns and Relations (Variables and Equations)
Students will:
- represent algebraic expressions in multiple ways.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	6.3 Sharon had some money; she spent \$5 and then she had \$7 left. How much money did Sharon have to begin with? Ted wrote the equation $m - 5 = 7$ and used algebra tiles to solve it.  $m - 5 = 7$ $m - 5 + 5 = 7 + 5$ $m = 12$ Sharon had \$12 to begin with. Use Ted's method to solve: Barb had some sports cards. She sold six and then she had 10 left. How many did she have to start with? 6.4 Have students solve equations, showing all their work. Ask them to exchange solutions with other students and use keys to mark each other's work. Students can identify the errors in their peers' solutions and explain how to fix them, and they can use partner feedback to correct their own work. Adapted with permission of the British Columbia Ministry of Education. 6.5 Discuss with students the value of algebraic operations for solving problems. Have them consider longer, more complicated equations that can be solved easily and quickly using algebra but that take much longer to solve using arithmetic. Adapted with permission of the British Columbia Ministry of Education.
7. Solve and verify two-step, single-variable, first-degree equations, using concrete materials, diagrams, informal algebraic methods, or formal algebra in the form: • $x + a = b$ • $ax = b$ • $\frac{x}{a} = b$ • $ax + b = c$ where a, b and c are integers. [CN, PS, V]	7.1 Nat had some stamps. He divided them into sets of six to put in his album. He made 17 sets. How many stamps did Nat have? 7.2 Joe had 5 sports cards. He bought 3 packs with the same number of cards in each pack. If he now has 35 cards in all, how many were in each pack? Solve, by using algebra tiles. Write an equation you could use to solve this problem.

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Strand: Patterns and Relations (Variables and Equations)
Students will:
- represent algebraic expressions in multiple ways.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	7.3 Hans gave Vera half his raffle tickets to sell. She lost seven of the tickets Hans gave her and had 23 left. How many tickets did Hans have to start with? Write an equation, and show how to solve it algebraically. Verify your answer by substituting it in your equation or by using counters. 7.4 Suggest that students work in pairs to construct flow charts of equation-solving procedures, then switch with other pairs and attempt to apply the steps to a given problem. Is there more than one way to solve the problem? Discuss as a class. Reproduced with permission of the British Columbia Ministry of Education. 7.5 To start a summer yard work program, a student took out a $3000 loan for 3 months. The student paid $90 interest on the loan. Find the monthly interest rate, using the formula $I = p \bullet r \bullet t$ (Interest = Principal × Interest Rate × Time). 7.6 Kassidy bought five CDs at the same price each and paid a total of $84.45. How much did each CD cost? Write an equation, and show how to solve it algebraically. Verify your answer by substituting it in your equation. 7.7 Maria had a length of fabric to make banners. She divided the fabric into six equal pieces, and each piece was 2.75 m long. a) What was the length of the fabric? Write an equation, and show how to solve it algebraically. b) Verify your answer by substituting it in your equation or by using strips of grid paper. 7.8 The following is some information that will be the basis of your constructing a word problem. It is 300 km from Regina to Gull Lake, Saskatchewan. About halfway between the two locations is Chaplin. Chelsea drives her car the speed limit on No. 1 highway. Alain drives his convertible 10 km slower than Chelsea. Write two problems or questions based on this information.

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Strand: Shape and Space (Measurement)
Students will:
- describe and compare everyday phenomena, using either direct or indirect measurement.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Estimate, measure and compare, using decimal numbers or fractions and standard imperial and SI units of measure. **Specific Outcomes**	
1. Select and use appropriate measuring devices and measurement units for direct measurements (in imperial or SI units) including: • length/perimeter • area • volume/capacity • mass to solve problems. [PS, CN, R, T]	1.1 Use a micrometre to measure the thickness of 10 sheets of paper. Use the results of this measurement to determine the thickness of one sheet of paper. 1.2 Fill three different empty tin cans with sand; e.g., a drink can, a soup can and a tuna can. Estimate the weight/mass of each. Use standard weights/masses and a balance scale to check your estimates. 1.3 Ask students to find objects that have a mass that is less than, more than and equal to 1 kilogram. Ask them to find objects that have a weight that is less than, more than and equal to 1 pound. Have them measure, record, compare and order the masses and weights. (This could be expanded to a scavenger hunt for objects of any given measurement.) 1.4 Ask students to construct an object, using modelling clay, that is a pound/kilogram. Have them measure to determine accuracy and share their strategies for determining the weight/mass of their modelling clay object.
2. Estimate measurements of objects in SI and imperial systems including: • length/perimeter • area • volume/capacity • mass. [R, CN, E]	2.1 Estimate the volume of a water bed bladder having a depth of 12 inches, a width of $5\frac{1}{2}$ feet and a length of 80 inches.
3. Solve problems involving linear dimensions, area and volume. [CN, PS, V]	3.1 Calculate the area of a flat rectangular surface measuring 21 feet by 14 feet. 3.2 Measure the internal dimensions of a rectangular container, and calculate its volume in cm^3. Find its volume in litres, and verify using a calibrated cylinder.

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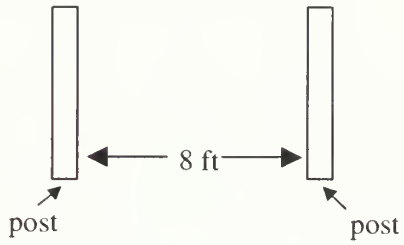
Strand: Shape and Space (Measurement)
Students will:
- describe and compare everyday phenomena, using either direct or indirect measurement.

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[E] Estimation and Mental Mathematics	[T] Technology
	[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	3.3 Frank is building a fence with 8 foot sections. Assuming there is to be no space between the boards, how many 1 × 6 fence boards should he order for each section? (Investigate the actual dimensions of a 1 × 6 fence board.)  Frank's fence has a total of 12 sections. How many boards should he order, if he includes 3% extra to allow for unusable lumber?
4. Convert between SI and imperial systems of measure, using a conversion table or calculator. [CN, PS, R, T]	4.1 <u>Metric Conversion Table</u> **Capacity:** 1 Canadian gallon — 4.546 litres 1 litre — 0.220 Canadian gallons **Volume:** 1 cubic inch — 16.387 cubic centimetres 1 cubic centimetre — 0.061 cubic inches 1 cubic yard — 0.765 cubic metres 1 cubic metre — 1.308 cubic yards **Length:** 1 inch — 2.540 centimetres 1 centimetre — 0.394 inches 1 foot — 0.305 metres 1 metre — 3.281 feet 1 yard — 0.914 metres 1 metre — 1.094 yards 1 mile — 1.609 kilometres 1 kilometre — 0.621 miles **Area:** 1 square inch — 6.452 square centimetres 1 square centimetre — 0.155 square inches 1 square foot — 0.093 square metres 1 square metre — 10.764 square feet 1 square yard — 0.836 square metres 1 square metre — 1.196 square yards 1 acre — 0.405 hectares 1 hectare — 2.471 acres **Mass:** 1 ounce — 28.350 grams 1 gram — 0.035 ounces 1 pound — 0.454 kilograms 1 kilogram — 2.205 pounds

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Strand: Shape and Space (Measurement)
Students will:
- describe and compare everyday phenomena, using either direct or indirect measurement.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	4.1.1 Bill's boss wants him to buy 600 pounds of concrete. Bill goes to "Builders' World" and notices that concrete can be purchased in 22 kg bags. How many bags should he buy? 4.1.2 Ryan is ordering gravel for a garage and driveway and determines he needs $8m^3$ of gravel. He telephones a gravel delivery company and finds out he can only order by the cubic yard. How many cubic yards of gravel should Ryan order?
5. Develop a sense of approximate conversions between SI and imperial units through investigations. [C, CN, E, PS, R, V]	5.1 Students can investigate the relationship between common items and their measure in both SI and imperial units. These might include the following: width of small finger ≅ 1 cm 2 fingers ≅ 1 inch 1 large stride ≅ 1 m 1 regular stride ≅1 yd 1 L milk has a mass = 1 kg or close to 2 lbs. 1 hour drive on highway ≅ 100 km or 60 miles 1 pop can ≅ 350 mL 4 L ≅1 gallon
General Outcome Generalize measurement patterns and procedures, and solve problems involving area, perimeter, surface area and volume. **Specific Outcomes**	
6. Use rules or expressions for determining the areas and perimeters of polygons by portioning them into rectangles and triangles. [C, CN, PS, T]	6.1 The dimensions of five decorative gardens are given below. Which garden has the greatest area? a) square with sides 10.2 m b) rectangle with length 15 m and width 6.9 m c) parallelogram with base 14.6 m and height 7.2 m d) triangle with base 16.5 m and height 12.4 m e) trapezoid with bases of 18.1 m and 10.4 m, and height 7.1 m.

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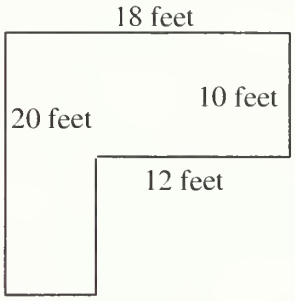
Strand: Shape and Space (Measurement)
Students will:
- describe and compare everyday phenomena, using either direct or indirect measurement.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	6.2 Silken, a journeyman carpenter, is installing hardwood flooring in her friend's L-shaped living room. She makes the following sketch of the room and includes measurements.  a) How many square feet of floor needs to be covered? b) One package of hardwood flooring will cover 14 square feet and costs $42.00 per package (not including GST). Silken knows that she should purchase 10% more material to allow for waste. • How many packages of hardwood flooring should she buy? • How much will the friend pay for hardwood alone? c) How much will Silken be paid if she charges her friend $2.50 per square foot of area covered? 6.3 You want to paint one wall of your room. The wall is 9.7 m long and 6.8 m high. It takes one litre of paint to cover 10 m^2, and the paint sells for $9.97 a litre. a) What would it cost you, if you purchase only paint? b) What else do you need to think of? 6.4 Melodie said that to find the perimeter of a triangle, you only have to measure one side and multiply by 3. Do you agree? Cut straws in several different lengths and make as many different triangles as you can. Use these straw triangles to explain your answer. Make a rule to find the perimeter of a triangle.

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Strand: Shape and Space (Measurement)
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[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]

6.5 Aaron sketched some parallelograms on grid paper and cut them out. Then he cut a piece off one end of each parallelogram and fit it on the other side to form a rectangle. He made this chart:

Base of Parallelogram	Height of Parallelogram	Area of Parallelogram	Base of Rectangle	Height of Rectangle	Area of Rectangle
3	4	12	3	4	12
2.5	3.5	8.75	2.5	3.5	8.75
1.5	4.2				
3	6.5				

Finish Aaron's chart, and look for a pattern. Test your pattern. Make a rule to find the area of a parallelogram. What other information should Aaron include on his chart to identify a pattern for finding the perimeter of a parallelogram?

6.6 Have students create simple blueprints of their dream homes, specifying the measurements of each room and calculating the areas and perimeters. Can students explain why it is important to know these measurements if they are going to build a house? Ask students to exchange their projects with other students and evaluate each other's work, using the following criteria:
a) Are the measurements realistic?
b) Based on the measurements students have supplied, are the calculations of area and perimeter accurate?

Collect and review the students' blueprints and the corrections and comments made by peers, and provide feedback.

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6.7 Give pairs of students maps of the world and select five countries for the class to study. Have each pair of students estimate the area of each country, using the map's scale and a centimetre grid. When they have finished, have them collect the class data and calculate an average area for each country. Have students consult the social studies text or another reference to check if the average determined by the class or an estimate determined by one of the pairs is closest to the actual area of each country. Encourage students to express the area in various ways; e.g., 3 400 000 km^2 or 3.4 million km^2.

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Strand: Shape and Space (Measurement)
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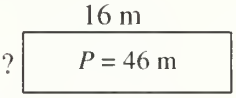
[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	6.8 Domenico has forgotten one dimension of a room. What is the missing dimension.  Three students each began to solve the problem. Domenico wrote: $P = L + W + L + W$ $46 = 16 + W + 16 + W$ Jake wrote: $P = (2 \times L) + (2 \times W)$ $46 = (2 \times 16) + (2 \times W)$ Owen wrote: $P = 2(L + W)$ $46 = 2(16 + W)$ Choose one boy's work and finish solving the problem. What is the missing dimension? Explain why you chose the work you did.
General Outcome Solve problems involving perimeter, area, surface area, volume and angle measurement. **Specific Outcomes** 7. Estimate, measure and draw angles, using a protractor. [E]	7.1 You are to draw a map to be used on a class field trip. Use a $8\frac{1}{2}$ x 11 inch sheet of white paper and label the top north. You might want to indicate south, east and west also. a) Mark and label point A as a starting point half way across the page, about 4 cm from the top. b) Make a line straight south 4 cm to point B. Draw a picnic table beside this point. c) From point B, measure a 150° angle going in a SE direction to form ∠ABC. Make line BC 8 cm long, and draw a garbage can beside this end point. d) From point C, measure a 225° angle going in a SW direction to form ∠BCD. Make line CD 11.5 cm long. This point is on the shore of the lake. Draw the lake. e) From point D, make a 7 cm line going straight west to point E. Draw the pier here.

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Strand: Shape and Space (Measurement)
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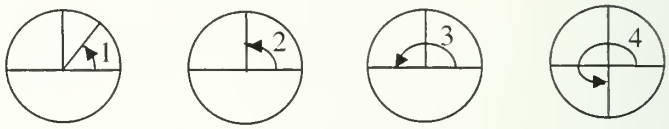
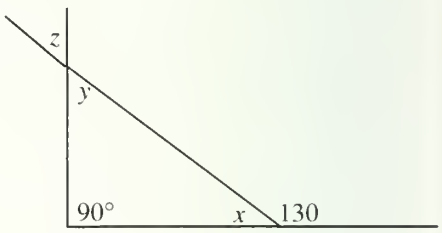
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	f) From point E, measure a 75° angle going in a NE direction to form ∠DEF. Make line EF 9 cm long. Draw a wood pile beside the end point. g) From point F, measure a 90° angle going west to form ∠EFG. Make line FG 6 cm, and draw a campground symbol here. h) From point G, measure a 60° angle going NE to form ∠FGB. You should be back at the picnic table. If the scale for your drawing is 1 cm = 0.25 km, how long is the trail you drew?
	7.2 Given the following circles:  a) Use a protractor to measure the above angles: ∠1, ∠2, ∠3, ∠4. b) Indicate the portion of the circle that each angle corresponds to; e.g., $\angle 3 = \frac{1}{2}$ circle. c) If you had a circle divided into 6 equal parts through the centre, what would be the measure of each sector in degrees?
8. Determine the measures of angles in a diagram. [R, V]	8.1 Find the measures of the indicated angles in the diagram below. 

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Strand: Shape and Space (Measurement)
Students will:
- describe and compare everyday phenomena, using either direct or indirect measurement.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Solve problems involving the properties of circles and their connections with angles and time zones. **Specific Outcomes**	
9. Measure the diameters, radii and circumferences of circles, and establish the relationships among them. [CN, R]	9.1 Gunther gathered a variety of circular objects, such as container lids and wheels. For each object, he measured the diameter with calipers and the circumference with a tape measure. He started making this chart:

Object	Diameter	Circumference	Relationship between Diameter and Circumference
nut can lid			
bicycle wheel			
coffee can			

He noticed a pattern in how the two measures for each object were related.

a) Estimate the relationship between diameter and circumference. Test it by measuring the diameter of another object and predicting the circumference before measuring it.
b) Use your calculator to find the relationship in each case.
c) Make a rule that relates the diameter and circumference of a circle.

9.2 Have students compare the difference in area of small, medium and large circular pizzas. Ask them to construct a graph to represent the relationship between the diameter and the area for each size. What generalizations can they make for this relationship?

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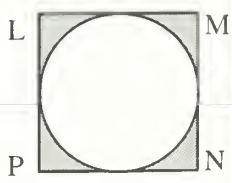
10. Calculate the area of a circle. [PS, T]	10.1 The perimeter of the square *LMNP* is 60 cm. What is the length of each side of the square? What is the area of the square? Find the: a) diameter of the circle b) circumference of the circle c) area of the circle d) area of the shaded region.



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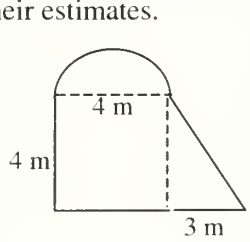
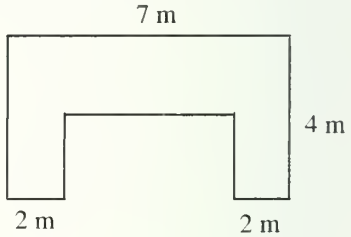
Strand: Shape and Space (Measurement)
Students will:
- describe and compare everyday phenomena, using either direct or indirect measurement.

[C]	Communication	[PS]	Problem Solving
[CN]	Connections	[R]	Reasoning
[E]	Estimation and Mental Mathematics	[T]	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
11. Solve problems involving the radii, diameters, area and circumferences of circles. [PS, T]	11.1 The pointed end on the minute hand of a clock travels 132 cm each hour. How long is the minute hand? 11.2 If Nel's bicycle wheel is 28 inches in diameter, how far can Nel go in one revolution? How far can she go in 10 revolutions?
General Outcome Apply indirect measurement procedures to solve problems. **Specific Outcomes** 12. Use concrete materials and diagrams to verify the Pythagorean relationship. [CN, R]	12.1 Tara is investigating the relationship among the three sides of a right triangle. She drew a right triangle in the middle of a sheet of grid paper and then constructed a square on each side of the triangle. Then she tried to cut the two smaller squares and fit them on the largest square. Try Tara's investigation, using right triangles with different shapes. Explain what you find. 12.2 Ask students to estimate the perimeters and surface areas of composite shapes and objects, like the ones below, then measure, calculate and compare the derived values with their estimates. Have students use their journals to reflect on the differences between their estimates and the actual measurements. Students could use drafting software to check their estimates.   Adapted with permission of the British Columbia Ministry of Education.

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Strand: Shape and Space (Measurement)
Students will:
- describe and compare everyday phenomena, using either direct or indirect measurement.

[C]	Communication	[PS]	Problem Solving
[CN]	Connections	[R]	Reasoning
[E]	Estimation and Mental Mathematics	[T]	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	12.3 Divide a piece of rope or string into 12 equal lengths, by placing tape on 13 spots. Ask three students to hold the rope in a way that constructs a triangle with a right angle—each student represents a vertex; one student holds the two ends of the rope together. Students should discover that there is only one solution. Discuss: a) Can any other right triangle be made? b) Does 3, 4, 5 always result in a right triangle? c) What are the applications? Challenge students to design another way to divide a rope that produces a right triangle; e.g., 5, 12, 13=30 parts; 7, 24, 25=56 parts. Students could use a calculator to find the triples. Adapted with permission of the British Columbia Ministry of Education. 12.4 Ask students to generate their own charts of Pythagorean triples and their multiples. For example: Original Triple / Times 2 / Times 3 / Times 10 3, 4, 5 / 6, 8, 10 / ___, ___, ___ / ___, ___, ___ 5, 12, 13 / ___, ___, ___ / 15, 36, 39 / ___, ___, ___ 7, 24, 25 / ___, ___, ___ / ___, ___, ___ / 70, 240, 250 Reproduced with permission of the British Columbia Ministry of Education.
13. Use the Pythagorean relationship to calculate the measure of the third side, of a right triangle, given the other two sides in 2-D applications. [PS, T]	13.1 Jamie wants to walk from one corner of the rectangular playing field to the opposite corner. The playing field is 90 feet by 150 feet. What is the shortest route he can take? Explain. 13.2 Invite students to find right triangles in the classroom. For each triangle, have students measure two of the sides and then use the Pythagorean relationship to calculate the third side. Are their calculations accurate? Can they explain the process? Reproduced with permission of the British Columbia Ministry of Education. 13.3 Provide pairs of students with a list of things to measure using the Pythagorean relationship. Ask students to compare their measurements in class and discuss the reasons for possible differences. Are the measurements reasonable? How plausible are their explanations of possible reasons for differences? Reproduced with permission of the British Columbia Ministry of Education.

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Strand: Statistics and Probability (Data Analysis)

Students will:

- collect, display and analyze data to make predictions about a population.

[C]	Communication	[PS]	Problem Solving
[CN]	Connections	[R]	Reasoning
[E]	Estimation and Mental Mathematics	[T]	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Evaluate and use measures of central tendency and variability. **Specific Outcomes**	
1. Determine measures of central tendency and variability for a set of data: • mode • median • mean • range. [PS]	1.1 You are the statistician for the school football team and have been asked by the yearbook editor for the mean height of the 45 team members. You collect the heights of the 45 players. They vary from 5 feet 6 inches to 6 feet 8 inches, and are each measured to the nearest half-inch. Using a calculator or a computer: a) describe in detail the keying procedures or menu choices that can be used to determine the mean height of the 45 players b) show that your procedure works, by using it to find the mean of 5 feet 11 inches, 6 feet $2\frac{1}{2}$ inches, 5 feet 9 inches, 6 feet 5 inches, and 5 feet $7\frac{1}{2}$ inches.
	1.2 Do a survey of your class on favourite car colour, and determine the mode.
2. Determine and use the most appropriate measure of central tendency in a given context. [CN, PS, T]	2.1 Explain why each of the following people might select the mean, median or mode in a set of data. a) A store owner deciding what sizes of shoes to order. b) Someone moving to a new city and looking at housing costs. c) Reporting the average score on a test.

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Strand: Statistics and Probability (Data Analysis)
Students will:
- collect, display and analyze data to make predictions about a population.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Develop and implement a plan for the collection, display and analysis of data using technology, as required. **Specific Outcomes**	
3. Read and interpret graphs. [C, E, PS, R]	3.1 Find some graphs in your local newspaper. Working in a group, discuss the following questions. a) Does the data give the information indicated? b) Is the type of graph appropriate for the data? c) Have scales, pictures or data groupings been selected to distort data? d) Does the graph present data clearly? Is it visually appealing?
4. Make predictions from data. [E, PS, R]	4.1 Collect data on the population of your school over the last 10 years. Graph the information. What would you predict the school population will be in six years? What trends do you see in the population? Can you suggest any reasons for these trends? Would enrollment figures suggest a need to increase the size of your school facility in the next ten years? Why or why not?

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Strand: Statistics and Probability (Data Analysis)
Students will:
- collect, display and analyze data to make predictions about a population.

[C]	Communication	[PS]	Problem Solving
[CN]	Connections	[R]	Reasoning
[E]	Estimation and Mental Mathematics	[T]	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
5. Display data by hand or by computer in a variety of ways, including circle graphs. [C, T, V]	5.1 Have students work in groups to research, via the Internet, examples of statistics used in a variety of situations; e.g., population statistics, professional sport, earthquake prediction, weather, loan risk. Students report their findings to the class, using appropriate graphs to display their data. Adapted with permission of the British Columbia Ministry of Education. 5.2 Keep a record of all your activities in a typical school day (24 h). Decide on categories for which the activities can be reported in number of hours (sleeping is an activity). Make a circle graph to show your typical school day. Share and compare graphs with other students. How can someone else's graph be useful to you?

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Strand: Number (Number Operations)
Students will:
- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

[C]	Communication	[PS]	Problem Solving
[CN]	Connections	[R]	Reasoning
[E]	Estimation and Mental Mathematics	[T]	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Describe and apply arithmetic operations on tables to solve problems, using technology as required. **Specific Outcomes** 1. Solve problems involving combinations of tables, using: • addition or subtraction within tables • multiplication of a table by a real number • spreadsheet templates. [PS, T, V]	1.1 The following is an income and expenses report for a business for the year ending December 31.

	Year 1	Year 2	Year 3
Total Sales	$135 000	$148 000	$166 000
Expenses			
Accounting	$ 1 500	$ 1 600	$ 1 900
Advertising	2 000	2 000	3 000
Rent	12 000	14 000	16 000
Repairs	4 000	5 000	5 500
Salaries	74 000	79 000	81 000
Miscellaneous	10 000	13 500	9 000
Total Expenses	$	$	$
Profit Before Tax	$	$	$
Income Tax (25%)	$	$	$
Net Profit	$	$	$

Enter the data from above onto a spreadsheet template provided to students. The template should include formulas to calculate missing values.

1.1.1 a) Calculate the dollar change in total sales and total expenses between each year in the table.
b) What are the reasons for the change in profit?

(continued)

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Strand: Number (Number Operations)
Students will:
- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]

1.1.2 a) Calculate the percentage change in total sales and total expenses between each year in the table.
b) Do your results agree with your answer in 1.1.1(b) above? Explain.

1.1.3 Prepare a line graph showing total sales, total expenses and profit before tax for the three-year period. Use the graph to determine which item has increased the most. Does your graph agree with your previous results?

1.1.4 Prepare a column for Year 4, assuming a 3 per cent increase in sales from Year 3. Generate your own expense column, and justify changes.

1.2 It costs $1.37 Canadian to buy 1 US dollar. **Note**: This rate changes daily.

a) Find the ratio of a Canadian dollar to a US dollar.
b) Find the ratio of a US dollar to a Canadian dollar.
c) How many US dollars will it take to buy 1 Canadian dollar?

These rates are located in currency tables and can be used to convert between different currencies.

	Canadian dollar	US dollar
Canadian dollar	—	1.37
US dollar	0.73	—

d) If you want to buy 500 US dollars, how many Canadian dollars would you have to spend?
e) Would it cost the same amount to buy $500 US in traveller's cheques? Explain.
f) Investigate commission rates charged by local financial institutions on money exchange transactions.

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[CN] Connections
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[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]

1.3 A banker needs to provide clients with information on foreign exchange. Use the foreign exchange chart provided, or a current chart from a newspaper, to answer the following questions.

a) Calculate the cost in Canadian dollars of a refrigerator that costs $850 US.

b) Calculate the cost in US dollars of an outboard motor selling in Canada for $1200.

c) Hans receives a cheque for 100 euros from his uncle in Berlin. How many Japanese yen would he get for this cheque? How many Canadian dollars?

Foreign Exchange

Cross rates

	Canadian dollar	US dollar	British pound	Euro	Japanese yen
Canadian dollar	–	1.3679	2.2360	1.6004	0.0117
US dollar	0.7310	–	1.6346	0.8547	0.0085
British pound	0.4472	0.6118	–	0.7158	0.0052
Euro	0.6248	1.1699	1.6004	–	0.0073
Japanese yen	85.7153	117.2500	191.6570	137.1820	–

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Strand: Number (Number Operations)
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[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Solve consumer problems, using arithmetic operations. **Specific Outcomes**	
2. Solve consumer problems, such as: • wages earned in various situations • exchange rates • unit prices • personal income tax calculation. [CN, E, PS, R, T]	2.1 Calculate and compare wage situations involving minimum wage rates, regular pay, overtime pay, gratuities, piecework, straight commission, salary and commission, salary plus graduated commission. 2.2 Jane has a choice of two restaurants at which to work. Mario's pays $8/h, and tips average $24 daily. Teppan's pays $5.50/h, and tips average $35 daily. If Jane works 30 hours weekly, spread over four days, how much would she earn at each restaurant? 2.3 Identify and calculate various payroll deductions, including income tax, CPP, EI, medical benefits, union and professional dues and life insurance premiums. 2.4 You can buy 900 g of dog food for $2.69 or 12.5 kg for $37.15. Which is the better buy? 2.5 Calculate your personal income tax, using an appropriate printed or electronic Revenue Canada Taxation form. **Note**: Revenue Canada will supply student activity booklets for this.

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Strand: Number (Number Operations)
Students will:
- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
3. Reconcile financial statements, such as: • chequebooks and electronic bank transactions with bank statements • credit card statements with payment receipts. [CN, PS, T]	3.1 The March opening balance of your bank account is $2504.32. The following personal transactions occurred during the month. March 1 pre-authorized withdrawal of $95.92 for car insurance March 1 interest payment of $0.04 March 4 deposited paycheque of $150.00 March 4 withdrew $20.00 for gas March 10 paid $8.72 for lunch, using debit card March 12 paid $17.11, by cheque, for a CD March 15 deposited paycheque of $150.00 March 17 paid $42.76 for a concert ticket, using debit card March 21 withdrew $25.00 spending money March 26 paid $21.87 for gas, using debit card March 31 transaction fee of $2.00 a) Determine the total amount of credits. b) Determine the total amount of debits. c) Find your bank balance for the end of March. d) Describe the pros and cons of paying a flat rate transaction fee. 3.2 Fill in the missing information: Credit Card Statement Account #123456 09/07 Previous Balance Owing $125.00 Payment—Thank you 100.00 11/07 Ralph's Tire Shop 36.99 20/07 The Shoe Shop 27.99 cr 27/07 Super Sports 24.87 30/07 Disco Jim's 79.99

Maximum Credit	Balance on Last Statement	Interest Charged	Total Purchases This Statement	Total Payment and Credits This Statement	New Balance
$500.00	$125.00	$2.30			
Due date: August 22			Minimum Payment 10% of Balance		
			Credit Remaining		

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[PS] Problem Solving
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[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]

3.3 Complete the table below to determine the cost of credit for using a charge account for the period shown. Monthly credit charges are 1.4% of the balance due.

Month	Previous Balance	−	Payment Made	+	Purchases Charged	⇒	Balance Due	+	Credit Charges	⇒	New Balance
February	$314.65		$100.00		$193.75				$5.72		$414.12
March			$150.00		$ 59.60						
April			$140.00		$421.83						$618.62
May	$618.62		$200.00		$ 39.65						
June			$250.00		$ 58.11						
July			$150.00		$ 77.21						
August	$206.68		$120.00		$163.09				$3.50		$253.27

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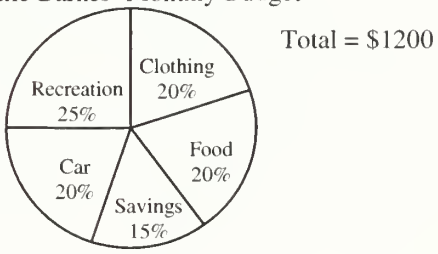
[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
4. Solve budget problems, using graphs and tables to communicate solutions. [C, PS, T, V]	4.1 Calculate the cost of running a car for a year. Decide how to classify each cost, how to collect the data and how to display the results. 4.2 As a project, prepare a budget for one of the following: a) the family b) a working single person/yourself c) a vacation d) a fishing/hunting/shopping trip. 4.3 Analyze a budget for a school or municipality. 4.4 The diagram shows Julie's monthly budget of $1200. She wants to move to an apartment that costs $450 per month. Construct a new budget that will include her rent. Explain the changes that Julie could make. Julie Barnes' Monthly Budget  Total = $1200
5. Plot and describe data of exponential form, using appropriate scales. [C, T, V]	5.1 Using the information below, create a graph; plot the number of bacteria on the vertical axis and time on the horizontal axis. Use the graph to predict the bacteria population by 12:00 p.m.

Time	Number of bacteria
8:00 a.m.	5
8:30 a.m.	10
9:00 a.m.	20
9:30 a.m.	40
10:00 a.m.	80
10:30 a.m.	160

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[C]	Communication	[PS]	Problem Solving
[CN]	Connections	[R]	Reasoning
[E]	Estimation and Mental Mathematics	[T]	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	5.2 The growth of a \$500 RRSP invested at an interest rate of 9% per year, compounded annually, is shown on the right. a) Plot this data. b) Estimate the time needed for the RRSP to reach \$1000. c) Determine the value of the RRSP after 10 years. d) Using a spreadsheet, estimate the value of the RRSP at the time of your retirement.
6. Solve investment and credit problems involving simple and compound interest. [CN, PS, T]	6.1 Calculate the amount, after various time periods; e.g., 1 year, 5 years, 10 years, of a deposit of \$1000. Assume the current nominal annual interest when the interest is compounded: a) annually b) monthly c) daily. Discuss the effects of compound interest.
	6.2 a) Investigate the current GIC annual interest rate. If \$2000 were deposited, for ten years, how much interest would be earned? b) A second bank offers an interest rate of 0.5% less per year, compounded quarterly. If \$2000 were deposited, for ten years, how much interest would be earned? c) Discuss the results.
	6.3 Calculate the interest paid on various forms of credit. Items for discussion may include such things as: rate of interest, payment options, methods of calculating interest. a) credit cards b) loans c) mortgages.
	6.4 You buy a bond for \$1000.00 at 5.25% interest for the first year. The interest rate increases by 1% each year. Calculate the total interest you would receive after 5 years, assuming the interest earned is paid to you annually and is not rolled in to the next year's investment.

Time (years)	Value (\$)
0	500
1	545
2	594
3	648
4	706
5	769

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[C] Communication
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[PS] Problem Solving
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[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]

6.5

	Card 1	Card 2
Balance Owing	$750.00	$750.00
Interest Rate Per Year	15%	18%
Annual Card Fee	$36.00	$0.00

Use the information from the chart above to answer the following questions.

a) Find the interest charged on both credit cards for the month, using the formula:

Interest = Principal × Interest Rate × Time

Note: Principal = Balance Owing

b) Including the card fee, which card is cheaper to use to make a cash advance of $750.00 that is paid back after one month?

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[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Modify an existing spreadsheet to make and justify financial decisions. **Specific Outcomes** 7. Modify a spreadsheet template to allow users to input their own variables. [C, PS, T]	7.1 Modify the following table to show: a) change in unit price b) change in quantity. ACME AUTO PARTS Customer Inquiries 7.2 Roger kept good records of the costs of running his compact car for the year. He found the following costs. Enter this data into a spreadsheet template. a) What was the total cost of running Roger's car for the year? b) If the price of gasoline increased to 75.0¢ per litre, how much **extra** would it cost Roger to run his car for the year? c) Display the cost record as a graph.

Item No.	Auto Parts	Quantity	Unit Price	Total	Labour	
1	Brake Pads	1	26.34	26.34	O/H Front Brakes	
2	Wheel Seals	2	5.25	10.50	1.5 hrs @ $57.00/hr	85.50
3	Rotor	1	30.16	30.16	Machined and Replaced Rotor	10.00
					Total Labour	95.50
			Total Parts	67.00	Total Parts	67.00
					Subtotal	162.50
					GST (7%)	11.38
					TOTAL	$173.88

Cost Category	Cost Incurred
Depreciation	$2650.00
Insurance and registration	$840.00
Tires	4 at $72.50 each
Oil changes	5 at $32.85 each
Gasoline	3340 litres at 68.0¢ per litre
Repairs	$115.00 for a tune-up $277.50 for brakes
Parking	$44.50 per month for 12 months
Washing	27 washes at $4.25 each
Interest on borrowed money	$1145.00

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[CN] Connections	[R] Reasoning
[E] Estimation and Mental Mathematics	[T] Technology
	[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
8. Use spreadsheet software applications to analyze leasing or buying a decreasing asset (vehicle, computer) under different sets of circumstances. [C, PS, T]	8.1 A car costs $15 366.05. A lease for the car runs for 36 months at $305 per month, with a down payment of $1105, a lease-end value of $7105 and an interest rate of 11.6%. The mileage restriction is 25 000 km/year. Excess mileage will cost 8¢/km. Maintenance is the purchaser's responsibility. Set up a spreadsheet to include the monthly value of the opening balance, payment, interest rate, interest paid, principal paid and closing balance. a) If the vehicle is purchased at lease-end, find the total cost. b) How much interest is paid? c) If the car has 85 827 km at the end of the lease and the car is not purchased, what will the extra kilometres cost? 8.2 Create another spreadsheet on the same car as described in illustrative example 8.1 but with a 20% down payment and an interest rate of 11.6%. Adjust the payments so that the straight purchase loan is paid totally in 36 months. Answer 8.1a and 8.1b again.
9. Analyze car, property or house insurance needs and premiums, using such concepts as loss, compulsory coverage, optional coverage, deductible and claims record. [CN, E, R, T]	9.1 Obtain from an insurance company the dollar values that are paid out for inexperienced drivers and for experienced drivers in the categories of liability, collision and comprehensive theft/glass. Calculate the insurance premium for $1 000 000 liability, $500 deductible collision and $100 deductible comprehensive theft/glass coverage. Do the calculations twice, once for each type of driver. What change in premium would you expect, if the deductible for collision were raised to $1000? 9.2 At what point is it worth it to drop collision coverage on an older vehicle? Show a strategy, and explain the supporting calculations.

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[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	9.3 How long does a security system need to be installed before the cost of the system is paid for by the savings in insurance premiums? Obtain data for your area from an insurance agent. Show a strategy, and explain the supporting calculations. 9.4 Obtain rates for property insurance for personal belongings. Estimate the value of your personal property, and calculate how much you would have to pay to insure it. Why is it important to have such insurance?

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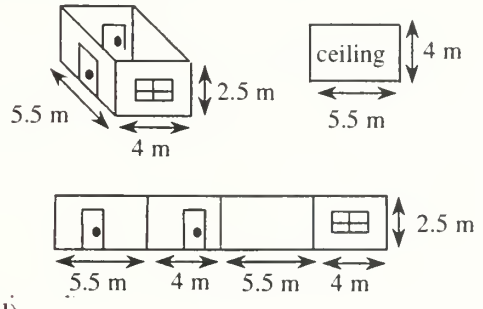
Strand: Shape and Space (Measurement)
Students will:
- describe and compare everyday phenomena, using either direct or indirect measurement.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Use measuring devices to make estimates and to perform calculations in solving problems. **Specific Outcomes** 1. Solve problems involving length, area, volume, time, mass and rates derived from these. [C, E, PS]	1.1 Cut some cereal boxes to form nets. a) How many faces does each have? b) What shape are the faces? c) Are any of the faces the same size? d) How could you find the area of each face? Use the data you collect to make a rule for finding the surface area of a right prism. Use your rule to find which of the cereal boxes has the greatest surface area. 1.2 Collect some cardboard cylinders that have lids. Cut the cylinders to form nets. a) How many faces does each have? b) What shape are the faces? c) Are any of the faces identical? d) Could you find the area of each face? Use the data you collect to make a rule for finding the surface area of a cylinder. Use your rule to find the surface areas of the cylinders. 1.3 Amy and John are planning to paint their apartment. The dimensions of the apartment are as follows:  (continued)

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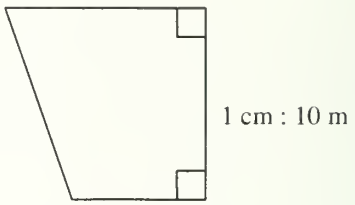
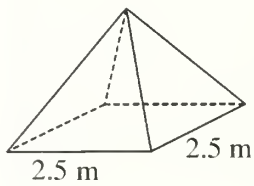
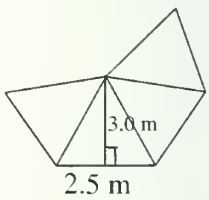
Strand: Shape and Space (Measurement)
Students will:
- describe and compare everyday phenomena, using either direct or indirect measurement.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	1.3 (continued) There are two doors, each 1 m x 2 m, and one window that is 50 cm x 125 cm. a) Determine the area of the ceiling to be painted. b) Determine the total area of the walls to be painted. c) What is the total area to be painted? d) If 1 L of paint covers 9.5 m^2, determine how many litres will be needed to paint the apartment. e) If a painter is able to paint 3 m^2 in 10 minutes, how long will it take to paint the room? 1.4 A person buys a property that is irregularly shaped. See scale drawing below.  What is the total area, in m^2, of the lot? 1.5 A sheet metal worker must fabricate a pyramidal cap for a square column. The base of the cap is 2.5 m by 2.5 m and the height of each triangle is 3.0 m. Determine the area of material needed.  

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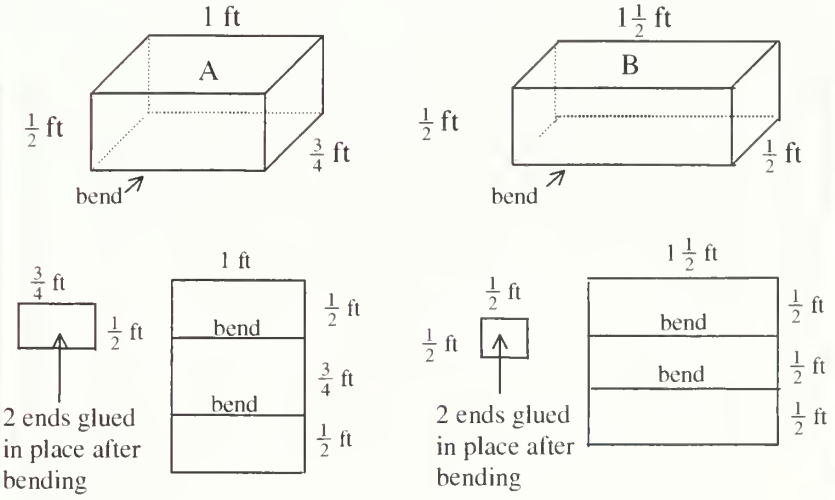
Strand: Shape and Space (Measurement)
Students will:
- describe and compare everyday phenomena, using either direct or indirect measurement.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	1.6 A one cubic centimetre container holds 1 mL of water, which has a mass of 1 g. a) A fish tank at the aquarium is 150 cm long and 60 cm wide. How many millilitres of water are in the tank if it is filled to a depth of 25 cm? b) How many litres is this? c) In kilograms, what is the mass of water in this tank? Why might this be important to know?
2. Interpret drawings, and use the information to solve problems. [C, PS, V]	2.1 Use the drawings below to answer the following questions. a) A box manufacturing company produces 2 open boxes, as shown below. Are the volumes identical? Explain your reasoning. b) If the material cost is \$4.50/ft^2 and glue costs \$0.70/ft, which box is cheaper to make? How much do you save? c) If a company manufactures 1000 of the cheaper boxes in a production run, how much money is saved? 

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Strand: Shape and Space (Measurement)
Students will:
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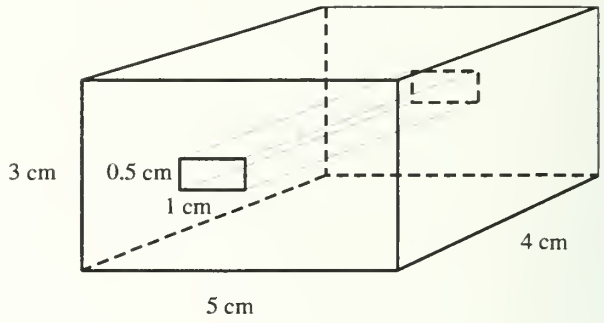
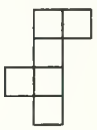
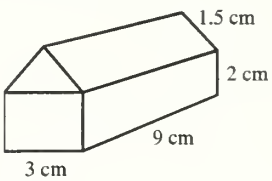
[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	2.2 First estimate, and then find, the volume and the surface area of the figure below. The figure is a 3 cm × 4 cm × 5 cm solid block of wood with a 1 cm × 0.5 cm × 4 cm hole cut in it. 
General Outcome Use spatial problem solving in building, describing and analyzing geometric shapes. **Specific Outcomes**	
3. Build 3-D objects from a variety of representations (nets, skeletons). [PS, V]	3.1 Raymond cut this net for a cube from grid paper. How many different nets can you cut that make cubes?  3.2 Find two different nets for a cylinder. 3.3 Use toothpicks and molding clay to build prisms and pyramids with various polygons for bases.
4. Draw the plan and elevations of a 3-D object from sketches and models. [C, R, T, V]	4.1 Draw and label the plan and the front, right and left elevations of this sketch. 

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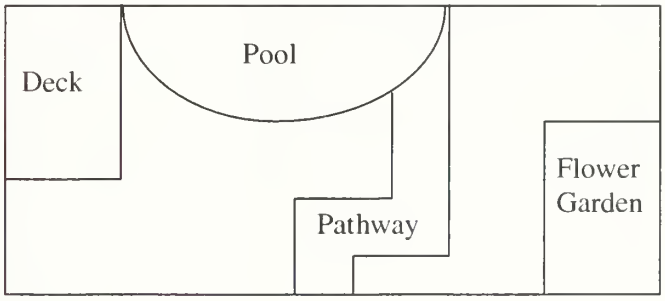
Strand: Shape and Space (Measurement)
Students will:
- describe and compare everyday phenomena, using either direct or indirect measurement.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Demonstrate an understanding of scale factors, and their interrelationship with the dimensions of similar shapes and objects. **Specific Outcomes**	
5. Describe the effects of dimension changes in related 2-D shapes when solving problems involving area. [C, CN, PS, R, V]	5.1 Have students use pipe cleaners or other construction materials to determine if a constant perimeter gives a constant area. Reproduced with permission of the British Columbia Ministry of Education. 5.2 Barrie wanted to fence a rectangular garden area. The fencing material comes in 1-m lengths that cannot be cut. If Barrie has 12 m of fencing, what are the dimensions of the largest garden area he can make? Draw a diagram to explain your reasoning.
6. Represent, analyze and describe enlargements and reductions. [CN, R]	6.1 Describe some everyday situations in which 2-D enlargements and reductions are necessary or useful; e.g., photocopies, photographs, scale models, statues. Explain how the enlargement or reduction is the same and how it is different from the original figure or object; e.g., size, shape, proportion. 6.2 If the following is drawn on 1 cm grid paper, draw its enlargement on 2 cm grid paper. 

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Strand: Shape and Space (Measurement)
Students will:
- describe and compare everyday phenomena, using either direct or indirect measurement.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	6.3 Using the following WHMIS symbols, have students place the original over 1 cm by 1 cm grid paper and then enlarge it on 3 cm by 3 cm grid paper to make a class poster. F H
7. Enlarge or reduce a dimensioned object, according to a specified scale. [C, CN, PS, V]	7.1 A classroom has dimensions of 30 feet by 25 feet. Produce a scale drawing of the classroom to a scale of 5 feet:1 inch. 7.2 Using surveyor's chains, tapes or other linear measuring devices, measure a chosen plot of land, and calculate its area. Make a scale drawing, using the same measurement system for the drawing as was used with the measurement instruments. 7.3 From the scale drawing below, construct an actual sized model of the box. Top View Scale = 1:3 Front View Side View

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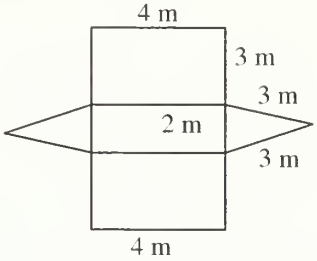
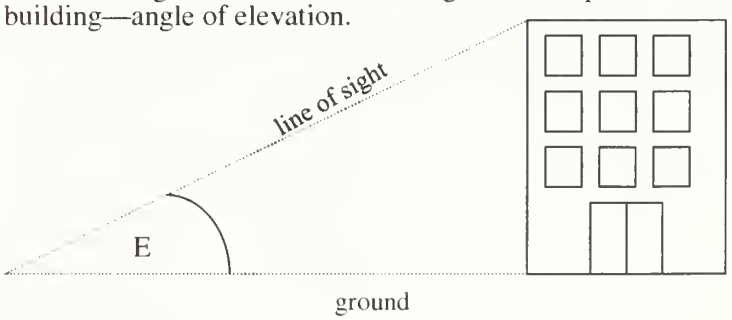
Strand: Shape and Space (Measurement)
Students will:
- describe and compare everyday phenomena, using either direct or indirect measurement.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
	7.4 To better visualize an object, designers often build models. Build a model of the tent that is shown in the net below, using the scale 10 cm = 1 m. 
General Outcome Use measuring devices to make estimates and to perform calculations in solving problems. **Specific Outcomes** 8. Design an appropriate measuring process or device to solve a problem. [E, PS, V]	8.1 Use right angles to measure base placement on a softball or baseball diamond. 8.2 Design a device to paint the circles on the ice at a curling rink. 8.3 Design an instrument you can use to determine the angle formed between the ground and the line of sight to the top of a tall building—angle of elevation.  E = angle of elevation 8.4 To calculate the number of students in your school who smoke, survey a class and use this data to estimate the number of smokers in your school. 8.5 You have just bought an odometer to go with your bike. In order for the odometer to work properly, you need to enter the circumference of the tire to determine how far it will travel in one revolution. If you bought a 26 inch bike tire, what number do you input into your bike's odometer?

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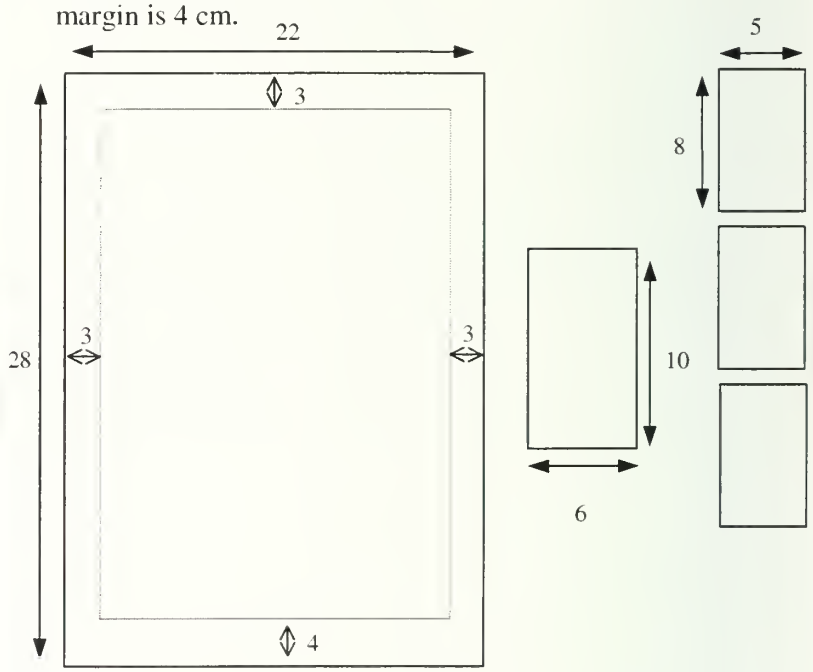
Strand: Shape and Space (3-D Objects and 2-D Shapes)
Students will:
- describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Develop and apply the geometric properties of circles and polygons to solve problems. **Specific Outcomes** 9. Use properties of circles and polygons to solve design and layout problems. [CN, PS, V]	9.1 You are preparing a school newsletter for parents. A standard sheet of paper is 28 cm by 22 cm, as is shown in the diagram below. You need to paste one table that is 10 cm by 6 cm and three tables that are 8 cm by 5 cm each onto the paper. The left, right and top margins on the page are 3 cm, and the bottom margin is 4 cm.  a) Prepare two possible layouts, assuming that the tables must be pasted with their long sides parallel to the left and right margins. b) Prepare two additional layouts with the long sides of the tables parallel to the top edge of the paper. c) What area is left over for including text on the page? Is this a reasonable amount? What percentage of the total area of the page (within the margins) is this?

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Strand: Shape and Space (3-D Objects and 2-D Shapes)
Students will:
- describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[E]	Estimation and Mental Mathematics	**[T]**	Technology
		[V]	Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]

9.2 A school has 293 students, all of whom have pictures to be put in the yearbook. The yearbook pages are $9\frac{1}{2}$ inches by 12 inches. The margins around the edge of the page must be 1 inch. Each photograph is 2 inches high and $1\frac{1}{2}$ inches wide. The minimum space between the edges of the pictures is $\frac{1}{2}$ an inch.

a) What is the maximum number of photographs that can be put on a single page?

b) Design a layout where:
- the number of pages is divisible by 8
- the least number of pages is used
- each page, except the last, has the same number of photographs.

9.3 A cylindrical can is 12 cm high and 6 cm in diameter. The can is closed, top and bottom. It is cut from a rectangular sheet of metal, and then the pieces are sealed together to form the can.

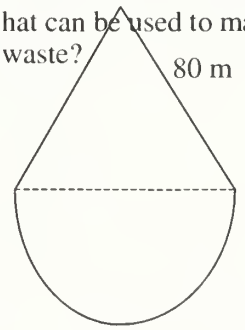
a) Determine the dimensions of a rectangle that can be used to make one can.

b) What area of the metal is wasted?

c) What percentage of the metal is wasted?

d) Share the results with your classmates. What are the dimensions of the rectangle that can be used to make one can with the least amount of waste?

9.4 The design of a water tank for seals is shown on the right. It is in the shape of an equilateral triangle with a semicircle attached to one side. Find the length of a guardrail around the whole tank.



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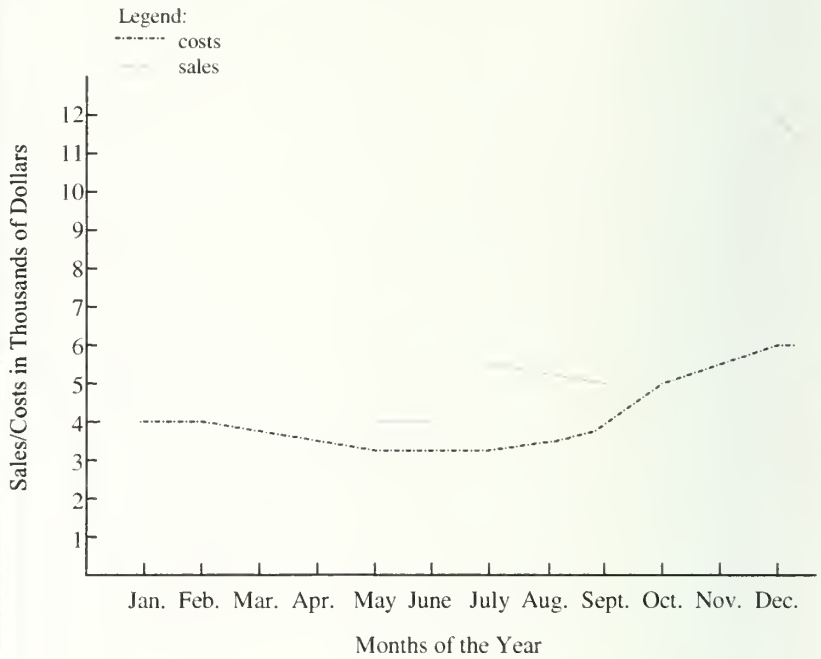
Strand: Statistics and Probability (Data Analysis)
Students will:
- collect, display and analyze data to make predictions.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Analyze graphs or charts of given situations to derive specific information. **Specific Outcomes** 1. Read and interpret given data. [C, CN, E, PS, R, V]	1.1 PROFIT/LOSS CYCLE FOR A DEPARTMENT STORE  A department store may experience "peaks" and "troughs" in its revenue (sales). Christmas season and summer holidays are the two strongest periods. January to April can be the weakest period. If net profits are greater than net losses over the year, the business can stay in operation. a) During periods of net loss, what might the business do for finances? b) Over which of the two curves, sales or costs, does the business have the most managerial control? c) Discuss the net profit for May.

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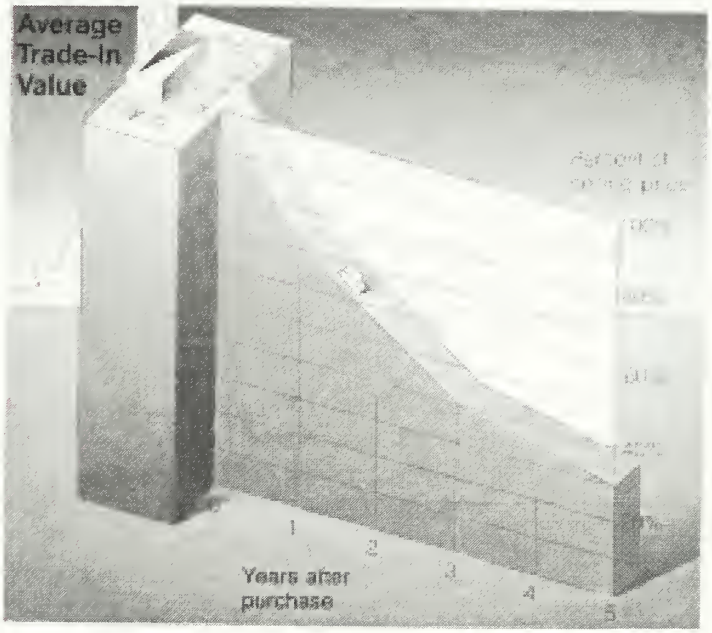
Strand: Statistics and Probability (Data Analysis)
Students will:
- collect, display and analyze data to make predictions.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
2. Critique ways in which statistical information and conclusions are presented by the media and other sources. [C, CN]	2.1 Collect data presented via newspaper, magazine, radio or television. a) How were samples for the data selected? Why do you think they were selected that way? Are they biased? b) Were the data collection methods appropriate for the data and the issue? c) How would you do it differently? Why? d) Are the data presented clearly and honestly? e) Do the conclusions follow logically from the data? f) What questions are left unanswered? Is this deliberate?
3. Draw and validate inferences, including interpolations and extrapolations, from graphical and tabular data. [CN, E, PS, V]	3.1 The trade-in value of a car decreases yearly. This loss in value is called depreciation and is illustrated in the graph below. The per cents given in the graph are based on the price of the car when it was new.  Carli et al., *Consumer and Career Mathematics*, p. 274. Reprinted and adapted with permission. a) Mark and Cathy bought a new car for $18 900 two years ago. What is the approximate trade-in value of the car, and how much has the car depreciated? b) Find the value of the car after 7 years. c) Make a generalization about the depreciation of a new car over several years.

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Strand: Statistics and Probability (Data Analysis)
Students will:
- collect, display and analyze data to make predictions.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Develop and implement a plan for the collection display and analysis of data. **Specific Outcomes**	
4. Discuss how collected data are affected by the nature of the sample, the method of collection, the sample size and biases. [C, CN]	4.1 Carmen designed and handed out 100 questionnaires to middle year students in her school. One question she asked was this: What do you want to be? Choose one. ☐ Doctor/Dentist ☐ Teacher ☐ Lawyer ☐ Sports Manager, Coach or Trainer 50 questionnaires were returned. Here are the results. Boys / Girls Doctor/Dentist: 9 / 6 Teacher: 2 / 11 Lawyer: 8 / 7 Sports Manager, etc.: 5 / 1 Carmen reached the conclusion that most students will become doctors or dentists. Tell if you agree with each of the following, and describe what else Carmen might have done: a) the wording of Carmen's question b) the method of gathering data c) the sample she chose to survey d) the conclusion she reached.
5. Describe issues to be considered when collecting data; e.g., appropriate language, ethics, cost, privacy, cultural sensitivity. [C, CN, R]	5.1 For each of these questions: a) Is there a relationship between wrist circumference and height? b) Does smoking cause lung cancer? c) Does pet ownership enhance the quality of life for senior citizens? Explain what would be the most appropriate methods for collecting data. Identify potential ethical problems, need for sensitivity to personal and cultural beliefs, and cost when designing questions and collecting data.

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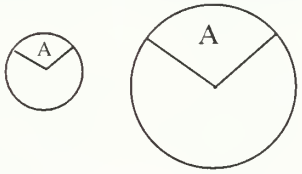
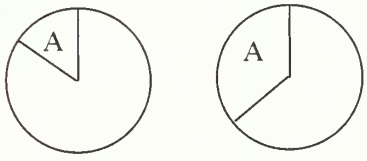
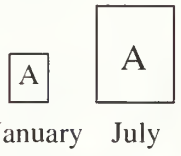
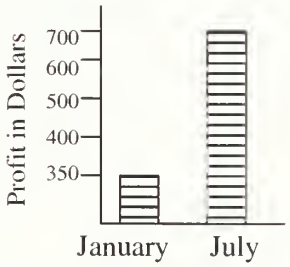
Strand: Statistics and Probability (Data Analysis)
Students will:
- collect, display and analyze data to make predictions.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
Specific Outcomes	
6. Select, defend and use appropriate methods of collecting data: • designing and using questionnaires • interviews • experiments • research. [C, PS, T]	6.1 As a member of your school's student council, you wish to determine the number of students who will attend a school dance. Explain how you could collect this information. 6.2 A city council is trying to determine if a major road in your district needs to be widened. Explain a procedure that could be used to help city council make this decision. 6.3 Bill surveyed people entering a theatre and asked them if they would support building a new sports arena in the community. Discuss this method of collecting data in terms of its appropriateness.
7. Design different ways of presenting data and analyzing results, by focusing on the truthful display of data and the clarity of presentation. [C, CN, T, V]	7.1 The amount of money Company A made doubled in 6 months. The following 4 graphs were given. i)  ii)  iii)  iv)  a) Which graph best represents the situation? b) Explain what is wrong with each of the other graphical representations and why they do not represent the situation.

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Strand: Statistics and Probability (Data Analysis)
Students will:
- collect, display and analyze data to make predictions about a population.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]

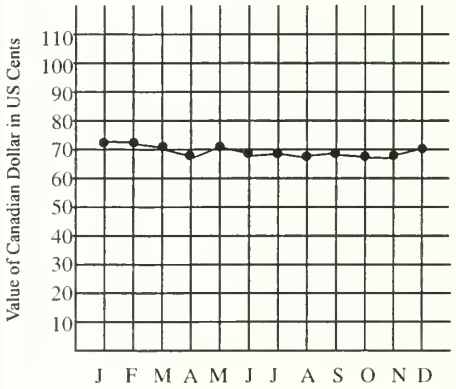
7.2 The value of the Canadian dollar in terms of US cents is given in the following chart. These values are recorded in graphs A and B, which use different vertical scales.

a) Do both graphs display the same data?
b) Which graph is easier to read?
c) Compare the vertical scales. How do they differ?
d) What message is delivered by Graph A? by Graph B? Discuss the differences.

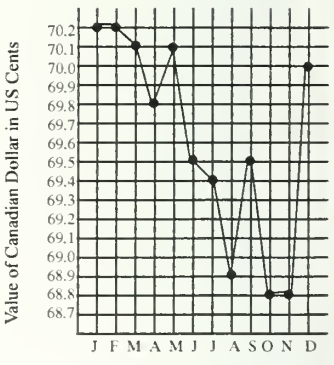
Value of Canadian Dollar in US Cents

January	70.2
February	70.2
March	70.1
April	69.8
May	70.1
June	69.5
July	69.4
August	68.9
September	69.5
October	68.8
November	68.8
December	70.0

Graph A



Graph B



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Strand: Statistics and Probability (Chance and Uncertainty)
Students will:
- use experimental or theoretical probability to represent and solve problems involving uncertainty.

[C] Communication
[CN] Connections
[E] Estimation and Mental Mathematics
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

General and Specific Outcomes	Illustrative Examples [Discretionary]
General Outcome Compare theoretical and experimental probability of independent events. **Specific Outcomes**	
8. Compare experimental results with theoretical results. [C, E, R]	8.1 You have a cube with faces numbered 1 to 6. a) What is the theoretical probability of rolling: a 6? a 4? a 1? b) Perform an experiment with a die and compare the results. 8.2 Ask students to work in groups to develop hypotheses that they can test; e.g., probability of selecting a given coloured candy from a bag when the quantities of each colour are known. Have groups calculate the theoretical probabilities, then conduct experiments to test their hypotheses. Reproduced with permission of the British Columbia Ministry of Education. 8.3 Invite an insurance agent to discuss with the class how insurance companies incorporate independent events in the calculation of premiums. Reproduced with permission of the British Columbia Ministry of Education.
9. Calculate theoretical probability, using numbers between 0 and 1. [E, PS]	9.1 There are 350 door prize tickets sold. If you buy 5 tickets, what is the probability of you winning the 1st prize drawn?
10. Recognize that if n events are equally likely the probability of any one of them occurring is $\frac{1}{n}$. [R]	10.1 If you toss one standard die, what are the possible outcomes? Are they equally likely? Explain. Write the probability of tossing a 4. If you did the same experiment with a 12-sided die, what would be the probability of tossing a 4? 10.2 If you draw a card from a deck, what suit could it be? Are all suits equally likely? What is the probability of drawing a heart? 10.3 Sherry takes a 100-item multiple-choice examination. Each item has four possible choices. She knows 68 of the answers and guesses randomly at the other 32. Calculate her expected number of correct answers.

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SECOND LANGUAGES

CONTENTS

French as a Second Language (ECS to Grade 12)

German Language and Culture 10–20–30

German Language and Culture 10S–20S–30S

Italian Language and Culture 10–20–30

Italian Language and Culture 10S–20S–30S

Japanese Language and Culture 10–20–30

Latin 10–20–30

Spanish Language and Culture 10–20–30

Spanish Language and Culture 10S–20S–30S

Ukrainian

- Three-year Program — Ukrainian 10–20–30
- Six-year Program — Ukrainian 10S–20S–30S

ITALIAN LANGUAGE AND CULTURE 10S–20S–30S

INTRODUCTION

Global Citizenship

Preparing youth to meet the challenges of the new millennium, in a world that is increasingly interdependent, is one of the more important objectives of language education.

Globalization and our multicultural society have increased the need for knowledge of other languages and cultures for effective communication, for better human relations within our own diverse Canadian society, and for a competitive edge in the shrinking world of economics.

Through the study of languages, students learn to recognize, respect and appreciate the cultural diversity of Canadian society and the countries of the world.

Learning Italian, just as learning any other language, develops thinking skills and learning strategies that are transferable to other learning situations.

Knowledge of Italian is helpful for understanding the development of European culture. The study of Italian also develops awareness of and sensitivity to the cultural and linguistic diversity of Canadian society.

A Means of Communication

Communication is the fundamental basis for human relationships. Italian is learned to enable communication with Italian speakers, but it is also useful in many fields of endeavour, including the study of bel canto; classical music; cultural, historical and scientific research; and travelling. Italy, as a modern industrialized country, attracts millions of people from every corner of the globe to its shores for many reasons.

Millions of Italians have migrated to many countries, including Canada, in the last two centuries. Language and culture have been retained wherever Italians have settled. Toronto, Montreal, New York and Melbourne are a few examples of cities where Italian culture has flourished and where language has been retained.

Personal and Cognitive Benefits

There is plenty of evidence to suggest that learning another language contributes to the development of first language skills and enhances not only vocabulary but improves cognitive functioning. Learning a second language increases the ability to conceptualize and to think abstractly; and it fosters more cognitive flexibility, greater divergent thinking, creativity and metalinguistic competence.

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Maintaining Language Skills and Cultural Connections

For those students who already have some knowledge of Italian or a family connection to the culture, there is the opportunity to renew contact with the language, culture and heritage.

Economic Benefits

In today's world, knowledge of another language and culture in general, and Italian language and culture in particular, is very valuable. It can open the door to exciting career opportunities in almost every kind of business, industry and profession. Indeed, the knowledge of another language and culture enables people to communicate and interact effectively in the global marketplace and workplace.

The Italian Language and Culture 10S–20S–30S program is intended for students who have studied Italian Language and Culture in junior high school.

ASSUMPTIONS

The following statements are assumptions that have guided the development process of the Italian Language and Culture 10S–20S–30S Program of Studies.

- Language is communication.
- All students can be successful learners of language and culture, although they will learn in a variety of ways and acquire proficiency at varied rates.
- All languages can be taught and learned.
- Learning Italian as a second language leads to enhanced learning in both the student's primary language and in related areas of cognitive development and knowledge acquisition. This is true of students who come to the class with some background knowledge of Italian and develop literacy skills in the language. It is also true for students who have no cultural or linguistic background in Italian and are studying Italian as a second language.

THE CONCEPTUAL MODEL

The aim of the Italian Language and Culture 10S–20S–30S Program of Studies is the development of communicative competence in Italian.

Four Components

For the purposes of this program of studies, communicative competence is represented by four interrelated and interdependent components.

Applications deal with what the students will be able to do with the language, the functions they will be able to perform and the contexts in which they will be able to operate.

Language Competence addresses the students' knowledge of the language and their ability to use that knowledge to interpret and produce meaningful texts appropriate to the situations in which they are used.

Global Citizenship aims to develop intercultural competence, with a particular focus on cultures of the Italian-speaking world.

Strategies help students learn and communicate more effectively and more efficiently.

Each of these components is described more fully at the beginning of the corresponding section of this program of studies.

Modes of Communication

Because of the focus on using language to communicate in specific contexts, with a particular purpose or task in mind, three modes of communication are used to organize some of the specific outcomes.

Interaction is most often direct, face-to-face oral communication, but it can take the form of written communication between individuals, using a medium such as e-mail where the exchange of information is fairly immediate. It is characterized principally by the opportunity to

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actively negotiate meaning; that is, helping others understand and working to understand others. Interactive communication generally requires more speed but less accuracy than the other two modes.

Interpretation is receptive communication of oral and written messages in contexts where the listener or reader is not in direct contact with the creator of the message. While there is no opportunity to ask for clarification, there is sometimes the possibility of rereading or listening again, consulting references, or making the meaning clearer in other ways. Reading and listening will sometimes involve **viewing** and interpreting visual elements, such as illustrations in books or moving images in television and film. Interpretation goes beyond a literal comprehension to include an understanding of some of the unspoken or unwritten meaning intended by the speaker or author.

Production is communication of oral and written messages in contexts where the audience is not in personal contact with the speaker or writer, or in situations of one-to-many communication; e.g., a lecture or a performance where there is no opportunity for the listener to interact with the speaker. Oral and written presentations will sometimes be enhanced by **representing** the meaning visually, using pictures, diagrams, models, drama techniques or other nonverbal forms of communication. Greater knowledge of the language and culture is required to ensure that communication is successful, since the participants cannot directly negotiate meaning.

Areas of Experience

In the Italian Language and Culture 10S–20S–30S Program of Studies, the following areas of experience are included:

Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
• fashion • celebrations • famous people • hobbies • leisure time • the community • any other areas that meet the needs and interests of the students	• professions and occupations • the environment • health • festivals • media • shopping • any other areas that meet the needs and interests of the students	• arts and literature • history • personal finances • peace and human rights • fitness for life • nutrition • any other areas that meet the needs and interests of the students

A Spiral Progression

Language learning is integrative, not merely cumulative. Each new element that is added must be integrated into the whole of what has gone before. The model that best represents the students' language learning progress is an expanding spiral. Their progression is not only vertical (e.g., increased proficiency) but also horizontal (e.g., broader range of applications and experience with more text forms,[1] contexts and so on). The spiral also represents how language learning activities are best structured. Particular areas of experience, learning strategies or language functions, for example, are revisited at different points in the program, but from a different perspective, in broader contexts or at a slightly higher level of proficiency each time. Learning is extended, reinforced and broadened with each successive pass.

1. For a sample list of text forms, see the end of this program of studies.

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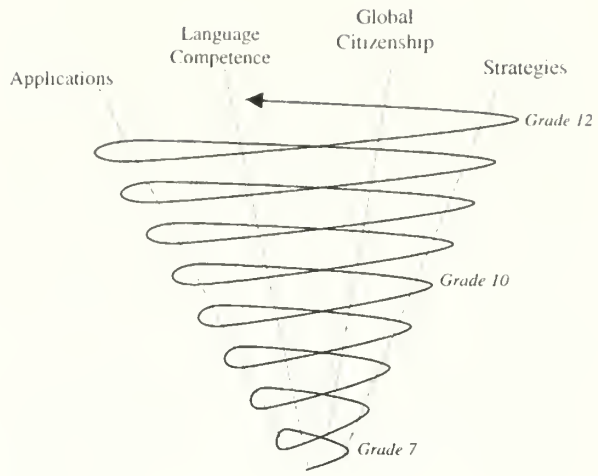

ORGANIZATION OF THE PROGRAM OF STUDIES

General Outcomes

General outcomes are broad statements identifying the knowledge, skills and attitudes that students are expected to achieve in the course of their language learning experience. The four general outcomes serve as the foundation for the Italian Language and Culture 10S–20S–30S Program of Studies and are based on the conceptual model outlined on the preceding pages.

Applications

- Students will use Italian in a variety of **situations** and for a variety of **purposes**.

Language Competence

- Students will use Italian **effectively** and **competently**.

Global Citizenship

- Students will acquire the knowledge, skills and attitudes to be effective **global citizens**, through the exploration of the cultures of the Italian-speaking world.

Strategies

- Students will know and use various strategies to maximize the **effectiveness** of learning and communication.

The order in which the general outcomes are presented in the program of studies does not represent a sequential order, nor does it indicate the relative importance of each component.

Specific Outcomes

Each general outcome is further broken down into specific outcomes that students are to achieve by the end of each course. The specific outcomes are interrelated and interdependent. In most classroom activities, a number of learning outcomes will be dealt with in an integrated manner.

The specific outcomes are categorized under cluster headings, which show the scope of each of the four general outcomes. These headings are shown as bullets in the chart on the following page.

The specific outcomes are further categorized by strands, which show the developmental flow of learning from the beginning to the end of the program. However, an outcome for a particular course will not be dealt with only in that particular year of the program. The spiral progression that is part of the conceptual model means that activities in the years preceding will prepare the ground for acquisition and in the years following will broaden applications.

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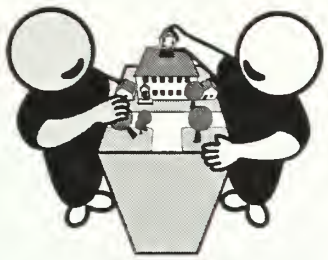
General Outcomes

Applications



Students will use Italian in a variety of **situations** and for a variety of **purposes**.

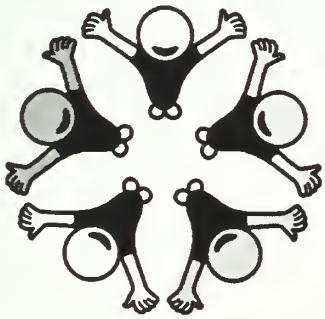
- to receive and impart information
- to express emotions and personal perspectives
- to get things done
- to form, maintain and change interpersonal relationships
- to extend their knowledge of the world
- for imaginative purposes and personal enjoyment

Language Competence

Students will use Italian **effectively** and **competently**.

- attend to form
- interpret and produce oral and written texts
- apply knowledge of the sociocultural context
- apply knowledge of how the Italian language is organized, structured and sequenced

Global Citizenship



Students will acquire the knowledge, skills and attitudes to be effective **global citizens**, through the exploration of the cultures of the Italian-speaking world.

- historical and contemporary elements of Italian-speaking cultures
- affirming and valuing diversity
- personal and career opportunities

Strategies

Students will know and use various strategies to maximize the **effectiveness** of learning and communication.

- language learning
- language use
- general learning

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Guide to Reading the Program of Studies

General Outcome for Applications
Students will use Italian in a variety of **situations** and for a variety of **purposes**.

cluster heading for specific outcomes

for imaginative purposes and personal enjoyment

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
humour/fun	• use Italian for fun and to interpret humour; e.g., interpret humorous cartoons, songs and poems	• use Italian for fun and to interpret and express humour; e.g., learn and perform songs, dances and short plays	• use Italian for fun and to interpret and express humour in a variety of situations
creative/aesthetic purposes	• engage in creative, aesthetic language activities; e.g., create a picture story with captions, or create and perform a skit	• use Italian creatively and for aesthetic purposes; e.g., write new words to a known melody, or create a rap	• use Italian creatively and for aesthetic purposes
personal enjoyment	• use Italian for personal enjoyment; e.g., find a personal pen pal and exchange letters	• use Italian for personal enjoyment; e.g., use the Internet, watch television or films	• use Italian for personal enjoyment in a variety of situations

read each page vertically for outcomes expected at the end of each course

strand headings for specific outcomes

specific outcome statements for each course

read each page horizontally for developmental flow of outcomes from course to course

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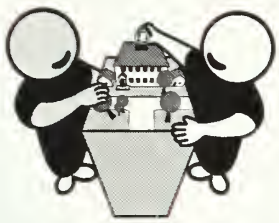

Applications

to express emotions and personal perspectives

to receive and impart information

to get things done

Students will use Italian in a variety of situations and for a variety of purposes.

to form, maintain and change interpersonal relationships

for imaginative purposes and personal enjoyment

to extend their knowledge of the world

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APPLICATIONS

The specific outcomes under the heading Applications deal with **what** the students will be able to do with the Italian language; that is, the **functions** they will be able to perform and the **contexts** in which they will be able to operate. This functional competence, also called actional competence,[2] is important for a content-based or task-based approach to language learning where students are constantly engaged in meaningful tasks.

The functions are grouped under six cluster headings—see the illustration on the preceding page. Under each of these headings there are one or more strands, which show the developmental flow of learning from course to course. Each strand, identified by a strand heading at the left end of a row, deals with a specific language function; e.g., share factual information. Students at any grade level will be able to share factual information. Beginning learners will do this in very simple ways; e.g., "This is my dog." As students gain more knowledge and experience, they will broaden the range of subjects they can deal with, they will learn to share information in writing as well as orally, and they will be able to handle formal and informal situations.

Different models of communicative competence have organized language functions in a variety of ways. The organizational structure chosen here reflects the needs and interests of students in a classroom where activities are focused on meaning and are interactive. For example, the strand entitled "manage group actions" has been included to ensure that students acquire the language necessary to function independently in small groups, since this is an effective way of organizing second language classrooms. The strands under the cluster heading "to extend their knowledge of the world" will accommodate a content-based approach to language learning where students learn content from another subject area as they learn the Italian language.

The level of linguistic, sociolinguistic and discourse competence that students will exhibit when carrying out the functions is defined in the specific outcomes for Language Competence for each course. To know how well students will be able to perform the specific function, the Applications outcomes must be read in conjunction with the Language Competence outcomes.

2. Marianne Celce-Murcia, Zoltán Dörnyei and Sarah Thurrell, "Communicative Competence: A Pedagogically Motivated Model with Content Specifications," *Issues in Applied Linguistics* 6, 2 (1995), pp. 5–35.

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General Outcome for Applications
Students will use Italian in a variety of **situations** and for a variety of **purposes**.

to receive and impart information

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
share factual information	• provide information on several aspects of a topic; e.g., give a simple report • understand and use definitions, comparisons and examples	• share facts about events that took place in the past or that may take place in the future	• share detailed information on a specific topic; e.g., a report or biography

to express emotions and personal perspectives

	Students will be able to:		
share ideas, thoughts, opinions, preferences	• inquire about and express agreement and disagreement, approval and disapproval, satisfaction and dissatisfaction, and interest and lack of interest	• inquire about and express probability and certainty	• express opinions • support their own opinions
share emotions, feelings	• inquire about and express emotions and feelings in a variety of familiar contexts • compare the expression of emotions and feelings in a variety of informal situations	• express emotions and feelings in formal situations; e.g., communicate a complaint in a store or restaurant	• compare the expression of emotions and feelings in formal and informal situations

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General Outcome for Applications
Students will use Italian in a variety of **situations** and for a variety of **purposes.**

to get things done

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
guide actions of others	• make and respond to suggestions in a variety of situations • give and respond to advice and warnings	• make and respond to suggestions or requests in formal situations; e.g., in a bank, department store, restaurant	• express a complaint
state personal actions	• state personal actions in the past, present or future • make a promise, and express intention in a variety of situations	• accept or decline an offer or invitation, giving an explanation	• express possibility in relation to their own actions
manage group actions	• check for agreement and understanding • express disagreement in an appropriate way • express appreciation, enthusiasm, support and respect for contributions of others	• clarify another member's contribution	• take on a leadership role in small-group projects • paraphrase and elaborate on another member's contribution

to form, maintain and change interpersonal relationships

	Students will be able to:		
manage personal relationships	• initiate and participate in casual exchanges with classmates • use routine means of interpersonal communications; e.g., telephone calls, personal notes, e-mail messages	• give and respond to compliments	• offer and respond to congratulations, and express sympathy or regret

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General Outcome for Applications
Students will use Italian in a variety of **situations** and for a variety of **purposes**.

to extend their knowledge of the world

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
discover and explore	• ask questions to gain knowledge and clarify understanding • explore meaning in a variety of ways; e.g., drawing a diagram, making a model, rephrasing	• explore and express the meaning of what they are doing; e.g., what they will learn from a particular activity	• explore connections among and gain new insights into familiar topics; e.g., using analogy, brainstorming
gather and organize information	• gather information from a variety of resources; e.g., print, human, multimedia • organize and manipulate information; e.g., transform information from texts into other forms, such as tables, diagrams and story maps	• gather information, using a prepared format; e.g., interview people using prepared questions	• identify key ideas, summarize, and paraphrase
solve problems	• describe a problem, and propose solutions	• generate and evaluate alternative solutions to problems	• use information collected from various sources to solve problems
explore opinions and values	• explore how values influence behaviour; e.g., describe characters and their motivations in a story	• provide reasons for their position on an issue • distinguish fact from opinion	• understand the concept of stereotype, and recognize stereotyping in a variety of situations

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General Outcome for Applications
Students will use Italian in a variety of **situations** and for a variety of **purposes**.

for imaginative purposes and personal enjoyment

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
humour/fun	• use Italian for fun and to interpret humour; e.g., interpret humorous cartoons, songs and poems	• use Italian for fun and to interpret and express humour; e.g., learn and perform songs, dances and short plays	• use Italian for fun and to interpret and express humour in a variety of situations
creative/aesthetic purposes	• engage in creative, aesthetic language activities; e.g., create a picture story with captions, or create and perform a skit	• use Italian creatively and for aesthetic purposes; e.g., write new words to a known melody, or create a rap	• use Italian creatively and for aesthetic purposes
personal enjoyment	• use Italian for personal enjoyment; e.g., find a personal pen pal and exchange letters	• use Italian for personal enjoyment; e.g., use the Internet, watch television or films	• use Italian for personal enjoyment in a variety of situations

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Language Competence

interpret and produce oral and written texts

attend to form

Students will use Italian effectively and competently.

apply knowledge of the sociocultural context

apply knowledge of how the Italian language is organized, structured and sequenced

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LANGUAGE COMPETENCE

Language competence is a broad term that includes linguistic or grammatical competence, discourse competence, sociolinguistic or sociocultural competence, and what might be called textual competence. The specific outcomes under Language Competence deal with knowledge of the Italian language and the ability to use that knowledge to interpret and produce meaningful texts appropriate to the situations in which they are used. Language competence is best developed in the context of activities or tasks where the language is used for real purposes; in other words, in practical **applications**.

The various components of language competence are grouped under four cluster headings—see the illustration on the preceding page. Under each of these headings there are several strands, identified by strand headings at the left end of each row, which show the developmental flow of learning from course to course. Each strand deals with a single aspect of language competence. For example, under the cluster heading "attend to form," there is a strand for phonology (pronunciation, stress, intonation), orthography (spelling, mechanical features), lexicon (vocabulary words and phrases) and grammatical elements (syntax and morphology).

Although the outcomes isolate these individual aspects, language competence should be developed through learning activities that focus on meaningful uses of the Italian language and on **language in context**. Tasks will be chosen based on the needs, interests and experiences of students. The vocabulary, grammar structures, text forms and social conventions necessary to carry out a task will be taught, practised and assessed as students are involved in various aspects of the task itself, **not in isolation**.

Strategic competence is often closely associated with language competence, since students need to learn ways to compensate for low proficiency in the early stages of learning if they are to engage in authentic language use from the beginning. This component is included in the language use strategies in the Strategies section.

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General Outcome for Language Competence
Students will use Italian **effectively** and **competently**.

attend to form

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
phonology	• produce essential sounds, stress and intonation patterns of the Italian language	• use intonation, stress and rhythm appropriately in familiar situations	• use intonation, stress and rhythm appropriately in a variety of situations
orthography	• apply basic spelling rules and use mechanical conventions with reasonable accuracy	• apply spelling rules and mechanical conventions consistently and accurately	• apply spelling rules and mechanical conventions consistently and accurately
lexicon	• use a repertoire of words and phrases in familiar contexts, within the following areas of experience: – fashion – celebrations – famous people – hobbies – leisure time – the community – any other areas that meet their needs and interests	• use a range of vocabulary and expressions in familiar contexts, within the following areas of experience: – professions and occupations – the environment – health – festivals – media – shopping – any other areas that meet their needs and interests	• use a range of vocabulary and expressions in a variety of contexts, within the following areas of experience: – arts and literature – history – personal finances – peace and human rights – fitness for life – nutrition – any other areas that meet their needs and interests • recognize that one word may have multiple meanings, depending on the context, and that various words and expressions may express the same idea

(continued)

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General Outcome for Language Competence
Students will use Italian **effectively** and **competently**.

(continued)

attend to form

grammatical elements

Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
Students will be able to:		
• use, in modelled situations,[3] the following grammatical elements:		
Nouns: – masculine ending in *-ema*; e.g., *il problema, i problemi* ***Pronouns:*** – double object; e.g., *me la, te la, gliela, ce la, ve la, la* (verb) *loro* ***Verbs:*** – present conditional of verbs in *-are, -ere, -ire*; e.g., *studierei, leggerei, dormirei* ***Adjectives:*** – irregular superlative; e.g., *ottimo, pessimo, maggiore, minore* ***Adverbs:*** – absolute superlative; e.g., *benissimo, malissimo, moltissimo, pochissimo* ***Prepositions:*** – compound; e.g., *per il, per la, con il, con la*	***Verbs:*** – past absolute of verbs in *-are, -ere, -ire*; e.g., *studiai, credei* or *credetti, dormii* – past conditional of verbs in *-are, -ere, -ire*; e.g., *avrei studiato, avrei letto, avrei dormito, sarei andato/sarei andata* – present subjunctive of verbs in *-are, -ere, -ire*; e.g., *che io studi, che io legga, che io dorma* ***Conjunctions:*** – used with subjunctive; e.g., *benchè, affinchè*	***Verbs:*** – imperfect subjunctive of verbs in *-are, -ere, -ire*; e.g., *che io studiassi, che io leggessi, che io dormissi*

(continued)

3. Modelled Situations: This term is used to describe learning situations where a model of specific linguistic elements is consistently provided and immediately available. Students in such situations will have an emerging awareness of the linguistic elements and will be able to apply them in very limited situations. Limited fluency and confidence characterize student language.

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General Outcome for Language Competence
Students will use Italian **effectively** and **competently**.

(continued)

attend to form

grammatical elements

Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
Students will be able to:		
• use, in structured situations,[4] the following grammatical elements:		
Pronouns: – indefinite: *ognuno, ognuna*	***Nouns:*** – masculine ending in *-ema*; e.g., *il problema, i problemi* – masculine ending in *-amma*; e.g., *il programma, i programmi* – *feminine ending in -si*; e.g., *la crisi, le crisi* ***Pronouns:*** – double object; e.g., *me la, te la, giela, ce la, ve la, la* (verb) *loro* ***Verbs:*** – present conditional of verbs in *-are, -ere, -ire*; e.g., *studierei, leggerei, dormirei* ***Adjectives:*** – irregular superlative; e.g., *ottimo, pessimo, maggiore, minore* ***Adverbs:*** – absolute superlative; e.g., *benissimo, malissimo, moltissimo, pochissimo* ***Prepositions:*** – compound; e.g., *per il, per la, con il, con la*	***Verbs:*** – present subjunctive of verbs in *-are, -ere, -ire* – past absolute of verbs in *-are, -ere, -ire* – past conditional of verbs in *-are, -ere, -ire* ***Conjunctions:*** – used with subjunctive; e.g., *benchè, affinchè*

(continued)

4. Structured Situations: This term is used to describe learning situations where a familiar context for the use of specific linguistic elements is provided and students are guided in the use of these linguistic elements. Students in such situations will have increased awareness and emerging control of the linguistic elements and will be able to apply them in familiar contexts with teacher guidance. Student language is characterized by increasing fluency and confidence.

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General Outcome for Language Competence
Students will use Italian **effectively** and **competently**.

(continued)

attend to form

grammatical elements

Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
Students will be able to:		
• use, independently and consistently,[5] the following grammatical elements:		
Nouns: – compound; e.g., *capolavoro* – collective; e.g., *classe* – abstract; e.g., *gioia* ***Pronouns:*** – relative: *a cui* – indefinite: *ognuno, ognuna* ***Articles:*** – partitive: *del, dei, dello, degli, della, delle, dell'* ***Verbs:*** – imperfect of verbs in *-are, -ere, -ire* – present tense of *sapere* and *conoscere* ***Negative Expressions*** *non* (verb) *più* *non* (verb) *ancora* *non* (verb) *mai* *non* (verb) *niente*	***Adverbs:*** – of time; e.g., *adesso, ora, durante, mentre*	***Nouns:*** – feminine ending in *-si;* e.g., *la crisi, le crisi* – masculine ending in *-ema*; e.g., *il problema, i problemi* – masculine ending in *-amma*; e.g., *il programma, i* programmi ***Pronouns:*** – indefinite: *qualcuno, qualcuna, ciascuno, ciascuna* – double object; e.g., *me la, te la, giela, ce la, ve la, la* (verb) *loro* ***Verbs:*** – present conditional of verbs in *-are, -ere, -ire* ***Adjectives:*** – irregular superlative; e.g., *ottimo, pessimo, maggiore, minore* ***Adverbs:*** – absolute superlative; e.g., *benissimo, malissimo, moltissimo, pochissimo* ***Prepositions:*** – compound; e.g., *per il, per la, con il, con la*

5. Independently and Consistently: This term is used to describe learning situations where students use specific linguistic elements in a variety of contexts with limited teacher guidance. Students in such situations will have consistent control of the linguistic elements and will be able to apply them in a variety of contexts with limited teacher guidance. Fluency and confidence characterize student language.

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General Outcome for Language Competence
Students will use Italian **effectively** and **competently**.

interpret and produce oral and written texts

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
aural interpretation	• understand the meaning of short oral texts in guided and unguided situations	• understand short oral texts on familiar topics in guided situations	• understand the main point and some supporting details of oral texts on familiar topics
written interpretation	• understand the main point and some supporting details of written texts on familiar topics in guided situations	• understand the main point and supporting details of written texts on familiar topics in guided situations	• understand the main point and specific details of written texts on a variety of topics
visual interpretation	• derive meaning from a variety of visual elements in a variety of media in guided situations	• interpret visual elements in a variety of media in guided and unguided situations	• interpret visual elements in a variety of media, and identify techniques; e.g., the purposes, intended audiences, messages and points of view
oral production	• produce oral texts on familiar topics, providing some detail in guided situations	• produce oral texts on familiar topics, providing a variety of details to support the main point in guided and unguided situations	• produce oral texts on familiar topics spontaneously and independently, providing a variety of details to support the main point
interactive fluency	• engage in short interactions on familiar topics	• manage simple, spontaneous, routine interactions, asking for repetition or clarification	• engage in spontaneous exchanges in a variety of situations
written production	• produce short, simple written texts in guided and unguided situations	• produce a variety of short, simple written texts in guided and unguided situations	• produce written texts on a variety of topics in guided situations
representation	• express meaning through the use of a variety of visual elements in guided situations; e.g., advertising, brochures, videos	• express meaning through the use of visual elements in a variety of media	• explore a variety of ways that meaning can be expressed through the visual elements in a variety of media

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General Outcome for Language Competence
Students will use Italian **effectively** and **competently**.

apply knowledge of the sociocultural context

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
register	• explore formal and informal uses of language in a variety of contexts	• adjust language to social situations and purpose	• use the appropriate level of formality with a variety of people in a variety of contexts
idiomatic expressions	• use learned idiomatic expressions in a variety of contexts, and identify unfamiliar idiomatic expressions in a variety of contexts	• explore and interpret idiomatic expressions in popular, contemporary culture	• interpret unfamiliar idiomatic expressions, and use learned idiomatic expressions appropriately in a variety of situations
variations in language	• recognize influences resulting in variations in language; e.g., age, social class, geographical region	• experiment with some variations in language	• experiment with and adapt to some variations in language
social conventions	• explore and use learned social conventions	• interpret and use a variety of social conventions	• interpret and use a variety of formal and informal social conventions
nonverbal communication	• use appropriate nonverbal behaviours in a variety of familiar contexts	• interpret and use a variety of forms of nonverbal communication, with guidance	• interpret and use a variety of forms of nonverbal communication

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General Outcome for Language Competence
Students will use Italian **effectively** and **competently**.

apply knowledge of how the Italian language is organized, structured and sequenced

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
cohesion/coherence	• use a variety of conventions to structure texts; e.g., pauses, titles, paragraphs and letter forms • use references within texts; e.g., subject and object pronouns, demonstratives	• use patterns involving time or chronological sequencing to produce and interpret texts	• use appropriate words and phrases to show a variety of relationships within texts
text forms[6]	• explore, understand and use various text forms, delivered through a variety of media, in guided situations; e.g., videotaped instructions, reports with visuals	• use a variety of familiar text forms and media in their own productions; e.g., recipes, comic strips, letters, radio or television reports, articles	• use knowledge of text forms to enhance interpretation and production of texts
patterns of social interaction	• initiate and respond to interpersonal communication patterns in guided situations; e.g., social invitations – accept/decline with explanation	• combine simple social interaction patterns to perform complex transactions and interactions; e.g., suggestion – accept/decline – persuade/negotiate	• use a wide range of social interaction patterns to deal with routine and some nonroutine transactions and interactions; e.g., request goods/services, express a complaint

6. For a sample list of text forms, see the end of this program of studies.

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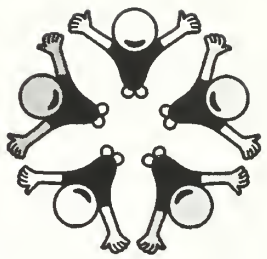
Global Citizenship



historical and contemporary elements of Italian-speaking cultures

affirming and valuing diversity

Students will acquire the knowledge, skills and attitudes to be effective global citizens, through the exploration of the cultures of the Italian-speaking world.

personal and career opportunities

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GLOBAL CITIZENSHIP

The learning outcomes for Global Citizenship deal with a broad range of knowledge, skills and attitudes needed to be effective global citizens—in other words, with the development of intercultural competence. The concept of global citizenship encompasses citizenship at all levels, from the local school and community to Canada and the world.

The various components of global citizenship are grouped under three cluster headings—see the illustration on the preceding page. Under each of these headings there are several strands, identified by strand headings at the left end of each row, which show the developmental flow of learning from course to course. Each strand deals with a single aspect of intercultural competence. For example, under the cluster heading "historical and contemporary elements of Italian-speaking cultures," there are strands for the processes and methods of acquiring knowledge about Italian-speaking cultures, applications of that knowledge to aid comprehension and to communicate in appropriate ways, positive attitudes toward Italian-speaking cultures, as well as knowledge of the diversity within those cultures.

Developing cultural knowledge and skills is a lifelong process. Knowledge of one's own culture is acquired over a lifetime. Cultures change over time. Within any national group, there may be a dominant culture or cultures and a number of minority cultures. Rather than try to develop a bank of knowledge about the Italian-speaking cultures, it is more important for students to learn the processes and methods of accessing and analyzing cultural practices. Students will gain cultural knowledge in the process of developing these skills. In this way, if they encounter elements of the Italian-speaking cultures they have not learned about in class, they will have the skills and abilities to deal with them effectively and appropriately.

The "affirming and valuing diversity" heading covers knowledge, skills and attitudes that are developed as a result of bringing other languages and cultures into relationship with one's own. There is a natural tendency, when learning a new language and culture, to compare it with what is familiar. Many students leave a second language learning experience with a heightened awareness and knowledge of their own language and culture. They will also be able to make some generalizations about languages and cultures based on their experiences and those of their classmates who may have a variety of cultural backgrounds. This will provide students with an understanding of diversity within both a global and a Canadian context.

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General Outcome for Global Citizenship
Students will acquire the knowledge, skills and attitudes to be effective **global citizens**, through the exploration of the cultures of the Italian-speaking world.

historical and contemporary elements of Italian-speaking cultures

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
accessing/ analyzing cultural knowledge	• formulate questions about elements of the cultures; e.g., patterns of behaviour or interaction typical of people their own age • use basic research skills to find out about the cultures • explore and identify some elements of the cultures; e.g., key historical events and their influence on contemporary ways of life and cultural values	• identify and use a variety of sources of information to find out about Italian cultures • explore and identify some elements of the cultures; e.g., major current events as a reflection of contemporary ways of life and cultural values	• organize and represent information about elements of Italian cultures in a variety of ways • explore and identify some elements of Italian cultures; e.g., cultural values, attitudes and interests of people their own age in an Italian culture
applying cultural knowledge	• explore and identify some social aspects of Italian life; e.g., festivals, sports, communities • understand behaviours that are different from their own; e.g., use of public transportation	• identify different perspectives on Italian cultures, and speculate on their origins; e.g., stereotypes of the cultures present in their own community	• apply knowledge of elements of Italian cultures in interactions with people and texts; e.g., interpret historical references
diversity within Italian-speaking cultures	• apply knowledge of Italian cultures to interpret similarities and differences among diverse groups within the cultures	• identify different perspectives on diverse elements of Italian cultures, and speculate on their origins; e.g., stereotypes within Italian cultures	• apply knowledge of diverse elements of Italian cultures, derived from a variety of sources, to interpret behaviours and texts
valuing Italian-speaking cultures	• identify contributions of Italian-speaking cultures to own society and to global society	• explore contributions of Italian-speaking cultures to own society and to global society	• seek out and use opportunities to interact with members of Italian cultures; e.g., exchange letters with a pen pal

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General Outcome for Global Citizenship
Students will acquire the knowledge, skills and attitudes to be effective **global citizens**, through the exploration of the cultures of the Italian-speaking world.

affirming and valuing diversity

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
awareness of first language	• compare oral and written aspects of their first language and Italian • identify some words in their first language that have been borrowed from Italian	• identify some regional variations in their first language	• identify aspects of their personal style in both speech and writing
general language knowledge	• recognize that languages can be grouped into families based on common origins • identify how and why languages borrow from one another	• recognize that languages may have regional differences in pronunciation, vocabulary or structure	• describe ways languages evolve over time, and provide reasons for this evolution
awareness of Canadian culture	• identify some influences on the development of their personal identity	• identify some of the past and present relationships between Italian cultures and their own; e.g., immigration, war, trade, travel	• recognize ethnocentric elements in documents from their own culture
general cultural knowledge	• recognize some of the factors that affect the culture of a particular region	• recognize that different cultures may have different interpretations of texts, cultural practices or products	• recognize that within any culture there are important differences in the way people speak and behave
valuing diversity	• recognize and acknowledge different perspectives	• recognize and acknowledge the value of different perspectives	• seek out opportunities to interact with people from various cultures who have an interest in the Italian language and in Italian cultures
intercultural skills	• explore various strategies for interpersonal communication with people from different cultures	• apply various strategies for interpersonal communication with people from different cultures	• identify and use various strategies for interpersonal communication with people from different cultures

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General Outcome for Global Citizenship
Students will acquire the knowledge, skills and attitudes to be effective **global citizens**, through the exploration of the cultures of the Italian-speaking world.

personal and career opportunities

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
Italian language and Italian-speaking cultures	• identify aspects of the history, literature, arts and crafts of Italian cultures that are of personal interest	• identify some careers that use knowledge of the Italian language	• explore opportunities for further education related to the Italian language and Italian-speaking cultures
cultural and linguistic diversity	• identify aspects of the history, literature, arts and crafts of different cultures that are of personal interest	• identify some careers that use knowledge of international languages and cultures and that use intercultural skills	• explore opportunities for further education related to languages and cultures

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Strategies

language learning

language use

Students will know and use various strategies to maximize the effectiveness of learning and communication.

general learning

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STRATEGIES

Under the Strategies heading are specific outcomes that will help students learn and communicate more **effectively**. Strategic competence has long been recognized as an important component of communicative competence. The learning outcomes that follow deal not only with compensation and repair strategies, important in the early stages of language learning when proficiency is low, but with strategies for language learning, language use in a broad sense, as well as general learning strategies that help students acquire content. Although people may use strategies unconsciously, the learning outcomes deal only with the **conscious use** of strategies.

The strategies are grouped under three cluster headings—see the illustration on the preceding page. Under each of these headings there are several strands that show the development of awareness and skill in using strategies from course to course. Each strand, identified by a strand heading at the left end of the row, deals with a specific category of strategy. Language learning and general learning strategies are categorized as cognitive, metacognitive and social/affective. The language use strategies are organized by communicative mode: interactive, interpretive, productive.

The strategies that students choose depend on the task they are engaged in as well as on other factors, such as their preferred learning style, personality, age, attitude and cultural background. Strategies that work well for one person may not be effective for another person, or may not be suitable in a different situation. For this reason it is not particularly useful to say that students should be aware of, or able to use, a specific strategy in a particular course. Consequently, the specific outcomes describe the students' knowledge of and ability to use general types of strategies. More specific strategies for each general category or type are included in the comprehensive list of strategies below. The specific strategies provided in the comprehensive list **are not prescriptive** but are provided as an illustration of how the general strategies in the specific outcomes might be developed.

Teachers need to know and be able to demonstrate a broad range of strategies from which students are then able to choose in order to communicate effectively. Strategies of all kinds are best taught in the context of learning activities where students can apply them immediately and then reflect on their use.

COMPREHENSIVE LIST OF STRATEGIES

Language Learning Strategies

Cognitive

- listen attentively
- perform actions to match words of a song, story or rhyme
- learn short rhymes or songs, incorporating new vocabulary or sentence patterns
- imitate sounds and intonation patterns
- memorize new words by repeating them silently or aloud
- seek the precise term to express meaning
- repeat words or phrases in the course of performing a language task
- make personal dictionaries
- experiment with various elements of the language
- use mental images to remember new information
- group together sets of things—vocabulary, structures—with similar characteristics
- identify similarities and differences between aspects of the Italian language and own language
- look for patterns and relationships
- use previously acquired knowledge to facilitate a learning task
- associate new words or expressions with familiar ones, either in Italian or in own language
- find information, using reference materials like dictionaries, textbooks and grammars
- use available technological aids to support language learning; e.g., cassette recorders, computers
- use word maps, mind maps, diagrams, charts or other graphic representations to make information easier to understand and remember

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- place new words or expressions in a context to make them easier to remember
- use induction to generate rules governing language use
- seek opportunities outside of class to practise and observe
- perceive and note down unknown words and expressions, noting also their context and function
- be aware of cognates whose meanings vary in different languages

Metacognitive
- check copied writing for accuracy
- make choices about how you learn
- rehearse or role-play language
- decide in advance to attend to the learning task
- reflect on learning tasks with the guidance of the teacher
- make a plan in advance about how to approach a language learning task
- reflect on the listening, reading and writing process
- decide in advance to attend to specific aspects of input
- listen or read for key words
- evaluate own performance or comprehension at the end of a task
- keep a learning log
- experience various methods of language acquisition, and identify one or more considered to be particularly useful personally
- be aware of the potential of learning through direct exposure to the language
- know how strategies may enable coping with texts containing unknown elements
- identify problems that might hinder successful completion of a task, and seek solutions
- monitor own speech and writing to check for persistent errors
- be aware of own strengths and weaknesses, identify own needs and goals, and organize strategies and procedures accordingly

Social/Affective
- initiate or maintain interaction with others
- participate in shared reading experiences
- seek the assistance of a friend to interpret a text
- reread familiar self-chosen texts to enhance understanding and enjoyment
- work cooperatively with peers in small groups
- understand that making mistakes is a natural part of language learning
- experiment with various forms of expression, and note their acceptance or nonacceptance by more experienced speakers
- participate actively in brainstorming and conferencing as prewriting and postwriting exercises
- use self-talk to feel competent to do the task
- be willing to take risks, and try unfamiliar tasks and approaches
- repeat new words and expressions occurring in own conversations, and make use of these new words and expressions as soon as appropriate
- reduce anxiety by using mental techniques, such as positive self-talk or humour
- work with others to solve problems, and get feedback on tasks
- provide personal motivation by arranging own rewards when successful

Language Use Strategies

Interactive
- use words from own first language to get meaning across; e.g., use a literal translation of a phrase in the first language, use a first language word but pronounce it as in Italian
- acknowledge being spoken to
- interpret and use a variety of nonverbal clues to communicate; e.g., mime, pointing, gestures, drawing pictures
- indicate lack of understanding verbally or nonverbally; e.g., *scusi*, *mi dispiace, non ho capito*, raised eyebrows, blank look
- ask for clarification or repetition when something is not understood; e.g., *Che cosa vuoi dire*?, *Può ripetere, per favore*?
- use other speakers' words in subsequent conversations
- assess feedback from a conversation partner to recognize when a message has not been understood; e.g., raised eyebrows, blank look
- start again, using a different tactic, when communication breaks down; e.g., *Quello che cerco di dire è ...*

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- use a simple word similar to the concept to convey, and invite correction; e.g., *pesce* for *trota*
- invite others into the discussion
- ask for confirmation that a form used is correct; e.g., *Si può dire così*?
- use a range of fillers, hesitation devices and gambits to sustain conversations; e.g., *ma, veramente, dov'ero*
- use circumlocution to compensate for lack of vocabulary; e.g., *quello per appendere i panni* for *attaccapanni*
- repeat part of what someone has said to confirm mutual understanding; e.g., *Allora, quello che tu vuoi dire è ...*
- summarize the point reached in a discussion to help focus the talk
- ask follow-up questions to check for understanding; e.g., *Mi spiego*?
- use suitable phrases to intervene in a discussion; e.g., *parlando di ...*
- self-correct if errors lead to misunderstandings; e.g., *Quello che voglio dire è ...*

Interpretive
- use gestures, intonation and visual supports to aid comprehension
- make connections between texts on the one hand and prior knowledge and personal experience on the other
- use illustrations to aid reading comprehension
- determine the purpose of listening
- listen or look for key words
- listen selectively based on purpose
- make predictions about what is expected to be heard or read, based on prior knowledge and personal experience
- use knowledge of the sound–symbol system to aid reading comprehension
- infer probable meanings of unknown words or expressions from contextual clues
- prepare questions or a guide to note down information found in a text
- use key content words or discourse markers to follow an extended text
- reread several times to understand complex ideas
- summarize information gathered
- assess own information needs before listening, viewing or reading
- use skimming and scanning to locate key information in texts

Productive
- mimic what the teacher says
- use nonverbal means to communicate
- copy what others say or write
- use words visible in the immediate environment
- use resources to increase vocabulary
- use familiar repetitive patterns from stories, songs, rhymes or media
- use illustrations to provide detail when producing own texts
- use various techniques to explore ideas at the planning stage, such as brainstorming or keeping a notebook or log of ideas
- use knowledge of sentence patterns to form new sentences
- be aware of and use the steps of the writing process: prewriting (gathering ideas, planning the text, researching, organizing the text), writing, revision (rereading, moving pieces of text, rewriting pieces of text), correction (grammar, spelling, punctuation), publication (reprinting, adding illustrations, binding)
- use a variety of resources to correct texts; e.g., personal and commercial dictionaries, checklists, grammars
- take notes when reading or listening to assist in producing own text
- revise and correct final version of text
- use circumlocution and definition to compensate for gaps in vocabulary
- apply grammar rules to improve accuracy at the correction stage
- compensate for avoiding difficult structures by rephrasing

General Learning Strategies

Cognitive
- classify objects and ideas according to their attributes; e.g., red objects and blue objects, or animals that eat meat and animals that eat plants
- use models
- connect what is already known with what is being learned

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- experiment with and concentrate on one thing at a time
- focus on and complete learning tasks
- record key words and concepts in abbreviated form—verbal, graphic or numerical—to assist with performance of a learning task
- use mental images to remember new information
- distinguish between fact and opinion when using a variety of sources of information
- formulate key questions to guide research
- make inferences, and identify and justify the evidence on which these inferences are based
- use word maps, mind maps, diagrams, charts or other graphic representations to make information easier to understand and remember
- seek information through a network of sources, including libraries, the Internet, individuals and agencies
- use previously acquired knowledge or skills to assist with a new learning task

Metacognitive

- reflect on learning tasks with the guidance of the teacher
- choose from among learning options
- discover how own efforts can affect learning
- reflect upon own thinking processes and how you learn
- decide in advance to attend to the learning task
- divide an overall learning task into a number of subtasks
- make a plan in advance about how to approach a task
- identify own needs and interests
- manage own physical working environment
- keep a learning journal, such as a diary or a log
- develop criteria for evaluating own work
- work with others to monitor own learning
- take responsibility for planning, monitoring and evaluating learning experiences

Social/Affective

- watch others' actions and copy them
- seek help from others
- follow own natural curiosity and intrinsic motivation to learn
- participate in cooperative group learning tasks
- choose learning activities that enhance understanding and enjoyment
- be encouraged to try, even though mistakes might be made
- take part in group decision-making processes
- use support strategies to help peers persevere at learning tasks; e.g., offer encouragement, praise, ideas
- take part in group problem-solving processes
- use self-talk to feel competent to do the task
- be willing to take risks, and try unfamiliar tasks and approaches
- monitor own level of anxiety about learning tasks, and take measures to lower it if necessary; e.g., deep breathing, laughter
- use social interaction skills to enhance group learning activities

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General Outcome for Strategies
Students will know and use various strategies to maximize the **effectiveness** of learning and communication.

language learning

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
cognitive	• identify and use a variety of cognitive strategies to enhance language learning; e.g., associate new words or expressions with familiar ones, either in Italian or in own language	• select and use a variety of cognitive strategies to enhance language learning; e.g., find information, using reference materials like dictionaries, textbooks and grammars, use available technological aids to support language learning	• select and use appropriate cognitive strategies to enhance language learning in a variety of situations; e.g., use word maps, mind maps, diagrams, charts or other graphic representations to make information easier to understand and remember
metacognitive	• identify and use a variety of metacognitive strategies to enhance language learning; e.g., evaluate own performance or comprehension at the end of a task, keep a learning log	• select and use a variety of metacognitive strategies to enhance language learning; e.g., experience various methods of language acquisition and identify one or more considered to be particularly useful personally	• select and use appropriate metacognitive strategies to enhance language learning in a variety of situations; e.g., be aware of the potential of learning through direct exposure to the language, know how strategies may enable coping with texts containing unknown elements
social/affective	• identify and use a variety of social and affective strategies to enhance language learning; e.g., seek help from others, get feedback on tasks	• select and use a variety of social and affective strategies to enhance language learning; e.g., take risks, try unfamiliar tasks and approaches	• select and use appropriate social and affective strategies to enhance language learning in a variety of situations; e.g., incorporate newly encountered words in subsequent conversations

Further examples of language learning strategies are available on pages 30 and 31.

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General Outcome for Strategies
Students will know and use various strategies to maximize the **effectiveness** of learning and communication.

language use

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
interactive	• identify and use appropriate interactive strategies to deal with specific communicative situations; e.g., invite others into discussions, ask for confirmation that a form used is correct	• select and use a variety of interactive strategies; e.g., use a range of fillers, hesitation devices and gambits to sustain conversations, use circumlocution to compensate for lack of vocabulary	• select and use appropriate interactive strategies in a variety of situations; e.g., repeat part of what someone has said to confirm mutual understanding, self-correct if errors lead to misunderstanding
interpretive	• identify and use a variety of interpretive strategies; e.g., prepare questions or a guide to note down information found in a text	• select and use a variety of interpretive strategies; e.g., use key content words or discourse markers to follow an extended text	• select and use appropriate interpretive strategies in a variety of situations; e.g., reread several times to understand complex ideas
productive	• identify and use a variety of productive strategies; e.g., be aware of and use the steps of the writing process	• select and use a variety of productive strategies; e.g., take notes when reading or listening to assist in producing own text	• select and use appropriate productive strategies in a variety of situations; e.g., use a variety of resources to correct texts, apply grammar rules to increase accuracy

Further examples of language use strategies are available on pages 31 and 32.

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General Outcome for Strategies
Students will know and use various strategies to maximize the **effectiveness** of learning and communication.

general learning

	Italian Language and Culture 10S	Italian Language and Culture 20S	Italian Language and Culture 30S
	Students will be able to:		
cognitive	• identify and use a variety of cognitive strategies to enhance general learning; e.g., use mental images to remember new information	• select and use a variety of cognitive strategies to enhance general learning; e.g., formulate key questions to guide research	• select and use appropriate cognitive strategies to enhance general learning in a variety of situations; e.g., seek information through a network of sources, including libraries, the Internet, individuals and agencies
metacognitive	• identify and use a variety of metacognitive strategies to enhance general learning; e.g., set up an environment favourable to learning	• select and use a variety of metacognitive strategies to enhance general learning; e.g., keep a learning journal such as a diary or a log	• select and use appropriate metacognitive strategies to enhance general learning in a variety of situations; e.g., take responsibility for planning, monitoring and evaluating learning experiences
social/affective	• identify and use a variety of social and affective strategies to enhance general learning; e.g., use encouragement and praise to help peers	• select and use a variety of social and affective strategies to enhance general learning; e.g., take part in group problem-solving processes	• select and use appropriate social and affective strategies to enhance general learning in a variety of situations; e.g., take risks, try unfamiliar tasks and approaches

Further examples of general learning strategies are available on pages 32 and 33.

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SAMPLE LIST OF TEXT FORMS

The following list is not intended to be prescriptive but is provided to suggest possibilities for expanding students' experience with different text forms.

Print Texts

- Advertisements
- Biographies and autobiographies
- Brochures, pamphlets and leaflets
- Catalogues
- Dictionary and grammar items
- Encyclopedia entries
- Folk tales and legends
- Forms
- Graffiti
- Instructions and other "how to" texts
- Invitations
- Journals, agendas, diaries and logs
- Labels and packaging
- Letters—business and personal
- Lists, notes, personal messages
- Maps
- Menus
- Newspaper and magazine articles
- Plays
- Poetry
- Programs
- Questionnaires
- Recipes
- Reports and manuals
- Short stories and novels
- Signs, notices, announcements
- Stories
- Textbook articles
- Tickets, timetables and schedules

Oral Texts

- Advertisements
- Announcements
- Ceremonies
- Debates
- Formal and informal conversations
- Interviews
- Lectures
- Messages
- Oral stories and histories
- Plays and other performances
- Raps
- Reports and presentations
- Songs
- Telephone conversations

Multimedia Texts

- Advertisements
- CD–ROMs
- Comic strips
- Computer and board games
- Movies and films
- Slide/tape/CD and video/DVD presentations
- Television programs
- Web sites

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